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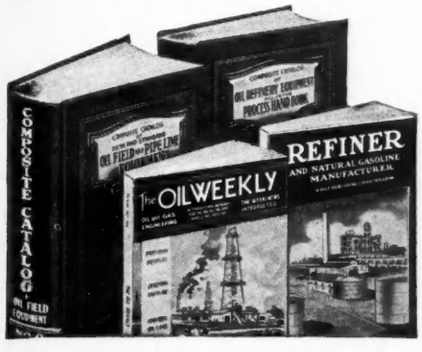

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The Oil Man's Calendar

DEC. 1–2	Mid-Continent Oil & Gas Assn., Standing Tax Committees, Dallas, Texas.
5–9	American Society of Mechanical Engineers, (Annual) New York.
7	Oil & Gas Association of Michigan, Mt. Pleasant, Michigan.
10	West-Central Texas Oil & Gas Association, Abilene, Texas.
MAR. 22–24	American Association of Petroleum Geologists, Oklahoma City, Okla.
APR. 13–14	National Petroleum Association, Cleveland, Ohio.
24–29	Oil-World Exposition, Houston, Texas.
MAY 3–5	Petroleum Electric Supply Association, Houston, Texas.
3–5	Petroleum Industry Electrical Association, Houston, Texas.

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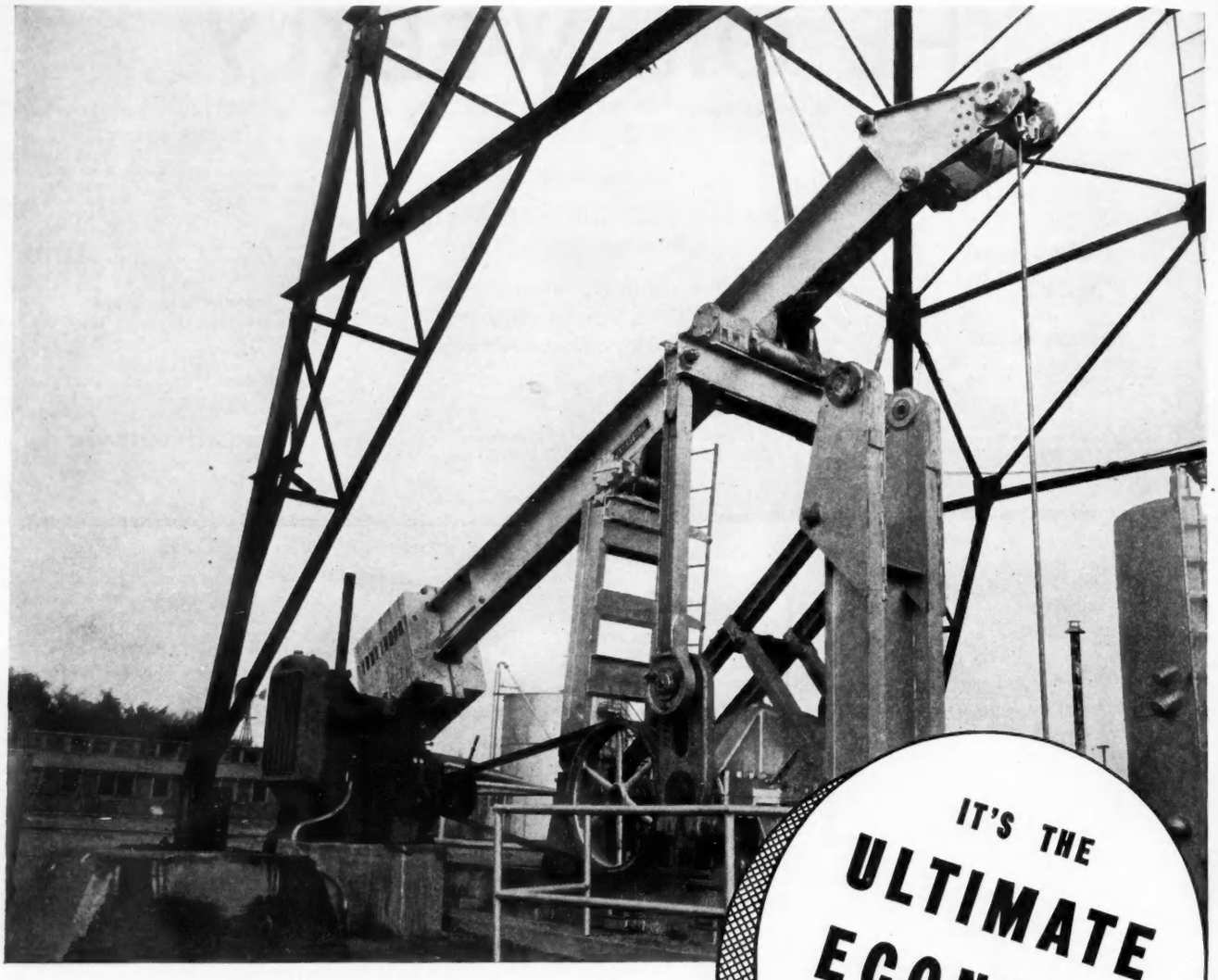

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This Week's Panorama

THE oil industry's outlook continues promising, because of both the general business improvement and the relatively good conditions within the industry.

It now is generally believed that business recovery will proceed at least through next spring, and some analysts think that prospects are good for a business upswing lasting possibly two years or more.

The optimistic opinions are based particularly on the increasing activity in the steel, construction, and other heavy goods industries. For vigorous business in those lines would be accompanied by general prosperity. In fact, the heavy goods industries failed to revive fully in the 1932-1937 recovery, and if they should gain large momentum in this recovery, general business might reach a higher peak in 1939 or 1940 than it did in 1937.

Oil Industry Situation Analyzed

The prospects for the oil industry were concisely analyzed at Chicago last week by Axtell J. Byles, president of the American Petroleum Institute at that association's annual convention.

He commented on the confidence prevailing among the motor people and predicted that the oil business would improve during the first half of 1939, although he attributed the current recovery partially to the "shot in the arm" that the government has given to business, through spending and lending. Byles would not attempt to look ahead beyond the middle of 1939.

He said that a factor in the recent crude price reductions was over-optimism in 1937, when crude production became excessive, although he added that the production situation had improved in 1938 through exercise of stricter control.

Crude oil and gasoline inventories now are near economic levels, the A.P.I. president stated, and distillate inventories are sound. The only burdensome inventories, he said, are those of residual fuel oils and lubricating oils; and the improvement in general business promises to correct them.

Oil Demand Outlook Promising

Very encouraging were the specific forecasts of oil demand made at the Chicago convention by Fred Van Covern, economist of the American Petroleum Institute.

He offered forecasts that new automobile sales would be about 40 percent larger in 1939 than in 1938, that gasoline consumption consequently would be up 4 percent, and that the country would consume 15 percent more furnace oil this winter than last winter.

Sales of around 3,000,000 new motor vehicles are expected in 1939, compared with 2,150,000 this year, the economist stated.

In commenting on the fuel oil situation, he said that the number of houses heated by oil has doubled in the past five years. About 1,690,000 homes in the United States will be oil-heated this winter, he added, and if the winter is normal, they will consume about 72,450,000 barrels of fuel oil.

Further Strict Curtailment Likely

The outlook for crude oil production control in the final month of this year is favorable. It has been indicated that the Texas Railroad Commission will continue Saturday and Sunday shutdowns of Texas fields through December, and if such action is taken, most of the other leading producing states probably will cooperate, as they are doing in November.

Legislation Depends on Industry

Conditions in the oil industry in coming months probably will determine whether any new-type federal oil legislation will be enacted in the next Congress.

If orderly conditions and good markets should be maintained, there would probably be very little demand for any far-reaching legislation, and efforts might be limited largely to re-enactment of the Connally hot-oil law and extension of the Interstate Oil Compact, both of which will expire in 1939 unless extended.

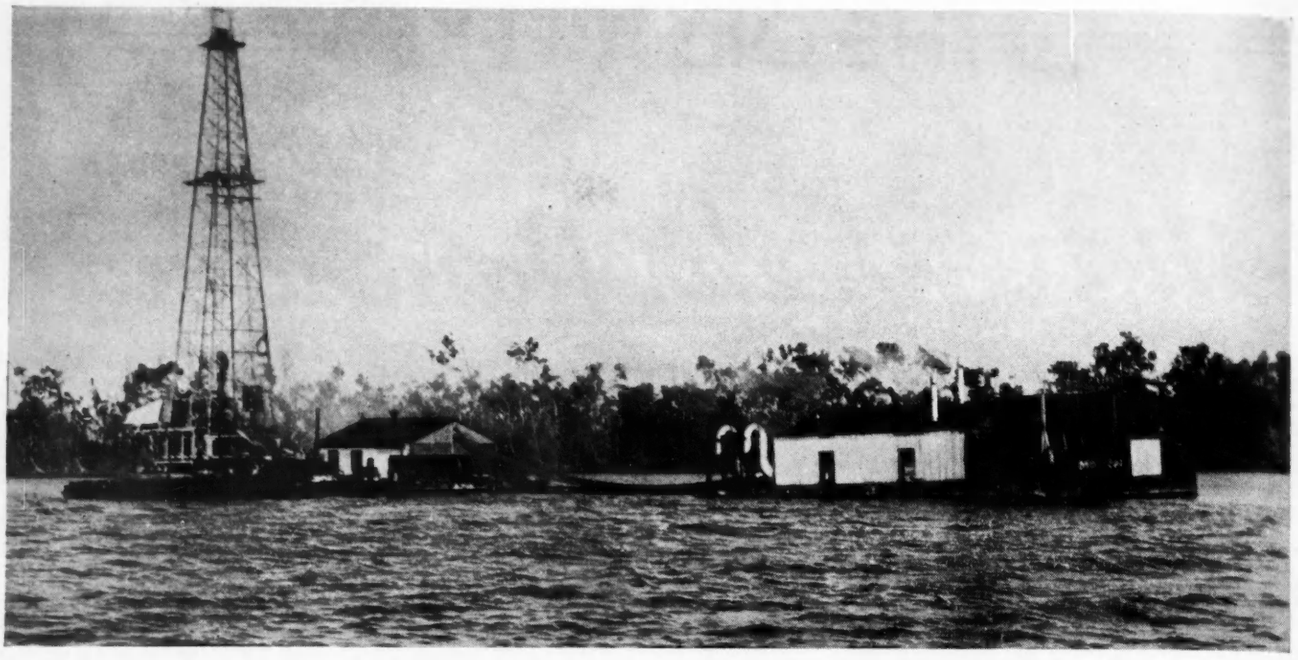
On the other hand, if any disorderly conditions should arise, in any branch of the industry, a renewal of agitation for federal regulation might be expected.

Under the circumstances, any constructive or cooperative action, on the part of major companies or independent operators, would be conducive to continued self-functioning of the industry; but any selfish or destructive action would invite governmental control.

TNEC to Investigate Oil

At best, the industry must be on the defensive, when the subject of new oil legislation arises. For many of the proposals that come up in Congress have as their ultimate aim the placing of the industry in the status of a public utility, with operations and profits strictly regulated.

Furthermore, the industry must be on its guard now more than usual, because it is being made the



A Diesel-electric two-barge drilling outfit used in the vicinity of Pedernales, Eastern Venezuela. Note the ventilator pipe running from the right-hand barge to the derrick, an arrangement providing safety in case of a blowout or other accident that might render the atmosphere on the rig floor dangerous

target of much current anti-monopoly agitation.

Available information indicates that the oil industry probably will be among the first subjects of public study by the Temporary National Economic Committee, which plans to begin hearings at Washington before the end of November.

Oil industry witnesses are expected to be called early in the hearings, perhaps by mid-December.

It is significant that of the six agencies and executive departments represented on the committee, the anti-trust division of the Department of Justice has been assigned the task of presenting information on the oil industry.

That division has prosecuted numerous anti-trust oil cases in recent years and has been almost continuously investigating complaints about practices in the oil industry. The division recently added 45 attorneys and economists to its staff because of increased work.

Members of the Temporary National Economic Committee insist, however, that their study should not be called a monopoly investigation; that the committee will not look for specific violations of law or act as a grand jury; that any industry singled out will be treated only as a laboratory specimen for the study of particular economic practices.

From the findings of the committee, suggestions for remedial legislation will be offered to Congress, and it is to be expected that ultimately the recommendations will include some affecting the oil industry.

It is expected that the oil industry investigation will involve study of numerous problems, including conservation of a natural resource, competition between small and large companies in production, refining, and distribution, pooling of patents, regulation of pipe lines, the degree of integration, relationships between parent and subsidiary companies, influence of proration on production and price, and so forth.

Meanwhile, the Department of Justice is proceeding with its prosecutions of oil companies under the federal government's broad anti-monopoly campaign.

The department has explained that the oil industry was singled out in the anti-trust drive because alleged violations of the laws appeared more evident than in other lines and because complaints from independents were more prevalent and vigorous. It has been further explained that only the inadequate force of attorneys and investigators provided for the anti-trust enforcement division of the department has prevented wide-spread investigations and prosecutions in other industries.

Exporting Provides Employment

The Department of Commerce has found that a large volume of employment in the United States is dependent on export trade. For 1937, it estimated that approximately 2,400,000 persons, equivalent to 5½ percent of all gainfully employed in the country, made their living from activities dependent on exporting. That was an increase of 312,000 over 1935 but still was nearly 800,000 below the 1929 level.

The report on the subject showed that in the petroleum industry about 29,000 persons were engaged in the production and distribution of goods for export in 1937, compared with 22,000 in 1935, 20,000 in 1933, and 35,000 in 1929.

Coal Pipe Lines Proposed

The petroleum industry ultimately may be affected, for better or worse, by plans that have been under study for delivering coal through pipe lines in the future. In one system, coal would be pulverized and mixed with a soap or water solution, and on reaching the destination it would be converted into briquettes. Another method calls for mixing pulverized coal directly with fuel oil, to form a mixture that could be burned as delivered.

Evaporation Losses Of Petroleum Oils From Steel Tanks

By C. C. Ashley, Shell Oil Company

The study upon which this report is based was undertaken in an effort so to correlate and compare all available data on tank evaporation losses that charts might be prepared to assist in the prediction of evaporation losses from petroleum oils in standing storage and while these oils are being pumped into tanks.

Conclusions: **A detailed review of a large amount of data on evaporation losses indicates that much of the information that has been published as comparable is not comparable, because there has been no common basis for comparison. Methods of presentation used have not included enough of the many variables affecting evaporation losses to insure results truly representative or comparable.**

The charts presented herein are based on a factor which is believed to be the most comprehensive of any so far used in this work, and upon which adequate correlation of tests made under widely variable conditions can be accomplished. This factor is "vapor pressure of oil at average temperature of oil in tank."

Two charts, which can be used for the prediction of losses, are presented: "evaporation loss of petroleum oils from standing storage in steel tanks," and "evaporation loss of petroleum oils due to pumping into steel tanks." The data upon which these charts have been prepared are rather meager, and the charts, consequently, are subject to revision as additional information becomes available.

Incidental to the preparation of the charts, it has become evident that there is a real need for a uniform procedure for conducting evaporation-loss tests which can be adopted generally, and which will facilitate co-ordination of results secured by different investigators. A suggested procedure is presented in the appendix to this report.

Presented before the Nineteenth Annual Meeting, American Petroleum Institute, Division of Production, Chicago, November 18, 1938.

THE economic significance of losses incurred from the evaporation of volatile fractions of petroleum oils during handling and storage began to receive the general attention of the oil industry early in the last decade, when the U. S. Bureau of Mines undertook a series of investigations which resulted in the publication of *U. S. Bur. Mines Bull. 200* (February 1922) and *319* (August 1923)—both written by J. H. Wiggins.

Since that time the subject has received a great deal of attention, as evidenced by the development of vapor-conservation devices such as tank breather valves, vapor inter-connecting and recovery systems, floating and breather roofs, tank-roof–insulation and cooling methods, etc.; yet there does not seem to have been developed any general plan of attack, either in the study of the magnitude of evaporation losses, or in the presentation of the data secured. Few data have been available from which could be made a reasonably accurate prediction of the evaporation losses that might be expected under any given storage or filling conditions, and upon which to base decisions regarding the most desirable type of roof construction or tank-venting facilities. Predictions have been avoided as far as possible, with the excuse that "there are too many variables involved."

This investigation was undertaken in an effort so to correlate and compare all available tank-evaporation–loss data that charts might be prepared to assist in making the desired predictions. Data have been secured from the files of Shell Oil Company and affiliated companies, from correspondence with and material published by equipment manufacturers, and from government and technical publications. More than 30 separate articles and reports, covering more than 200 individual tests, have been reviewed, and

the essential data tabulated; and from these data have been selected the 62 items used in the preparation of the charts.

The original data were secured by various test methods, including quantitative determination of the amounts of vapor lost and of the change of oil volume in the tanks, and qualitative determination of the change in physical properties of the oil as a result of the loss. A discussion of various test methods follows.

Evaporation-Loss Test Methods

Quantitative test methods are:

1. Measurement of vapors lost.
2. Measurement of change of oil volume.

1. Measurement of vapors lost involves volumetric determination of the vapor quantity discharged from a tank while breathing out, and analysis of the vapors to determine their hydrocarbon content, from which the volumetric loss of hydrocarbon can be computed. Orifice-meter measurements of vapor volumes are the simplest and most accurate, while vapor richness may be determined by absorption with activated charcoal or by an absorption train, or by the "freezing method" which liquefies the hydrocarbons in the exhaled vapor. The latter method is the most accurate, and appears to give results sufficiently reliable to use in studies of this kind.

The serious defect in tests made by vapor-volume measurements lies in the fact that it is usually quite difficult to insure that there are no roof leaks, i.e., that all vapor is discharged at the point of measurement; for vapor losses not recorded nullify the accuracy of the method.

2. Measurement of changes of oil volume are made by customary gaging methods, and are subject to all the inaccuracies thereof. Large tanks cannot be gaged closely enough to detect small losses, while in every case losses due to tank leakage cannot be separated from those due to evaporation. The effect of tank-bottom leakage can be minimized by carrying a water gage, but shell leakage cannot be prevented nor, with volatile oils, detected.

Gaging methods should not be used except as a check on other more accurate methods, because of the uncertainty of the magnitude of leakage losses which are unavoidably included.

Qualitative test methods are:

1. Determination of change of distillation characteristics.
2. Determination of change in composition of oil with respect to the most volatile fractions.
3. Determination of change of vapor pressure of the oil.

1. Early investigators found that changes of the physical properties of an oil due to the loss of volatile fractions could be used as an indication of the amount of loss, and used fractional distillations according to the U. S. Bureau of Mines method. The change of slope of the U. S. Bureau of Mines distillation curve at the 10-percent point was used as the basis of loss determination. This method is no longer used, as it was found lacking in the inherent accuracy required in this work.

2. The change in the composition of an oil with respect to its most volatile fractions, as determined by Podbielniak analysis, has been used to some extent. The accuracy of this method is open to question, inasmuch as it is assumed as part of the procedure that there are no losses of the heavier fractions of the oil by evaporation—which may not be strictly true.

3. Methods involving the change of vapor pressure of an oil with a loss by evaporation appear to be the most desirable for the determination of such losses. The rapidity with which evaporation occurs is dependent directly on the vapor pressure; consequently, that property is the most logical to use in loss studies, while the test methods that have been developed appear to possess the necessary accuracy.

One basic assumption must be made in any test method involving changes of the physical properties of oils because of evaporation loss, viz., that the fractions evaporated in laboratory test apparatus are the same as those lost from the oil in the tanks under field conditions. The probable error from this source is believed to be negligible.

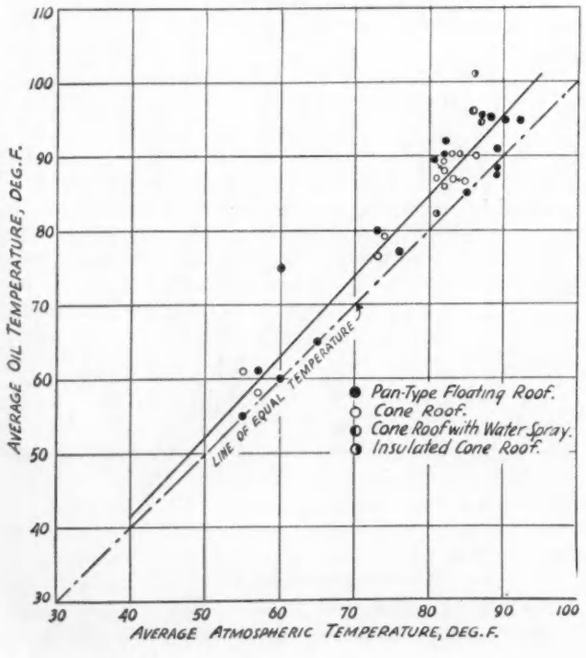
Early applications of vapor-pressure method were made by weathering weighted laboratory samples of the oils in question to establish the change of vapor pressure with loss in weight. To reduce field observations to a volumetric basis required that the specific gravity of the fractions lost be assumed, which reduced the accuracy and value of the method.

At the 1930 meeting of the American Petroleum Institute Messrs. Chenicek and Whitman, of Standard Oil Company (Indiana), presented a paper outlining a procedure and apparatus for a vapor-pressure method of determining evaporation losses. Their apparatus gave vapor-pressure readings corresponding directly to percentage volumetric loss of oil—which eliminated the assumptions required with earlier methods to convert weighted to volumetric losses.

This method is felt to be the best now available. Its only weakness lies in the method of sampling, the standard procedure being to take samples from the mid-depth of the oil in the tank—which may not be truly representative of the tank contents in cases

FIGURE 1

Relation of Atmospheric Temperature to Temperature of Standing Oil in Steel Storage Tanks.



where evaporation losses are high and the surface layer of the oil may contain different fractions from the main body of the oil.

Additional field study to establish a sampling procedure that would insure the taking of representative samples seems desirable.

Discussion

It became evident early in this investigation that, if charts were to be prepared successfully, it would be necessary to eliminate, or combine to secure the same effect, many of the variables affecting evaporation losses. The following variables must be included for consideration:

Vapor pressure of the oil.

Oil surface temperature.

Average oil temperature.

Weather, which includes sun, wind, rain, cloud, fog, etc.

Tank size.

Kind of tank roof, including vents.

Pressure setting of vent valves, when used.

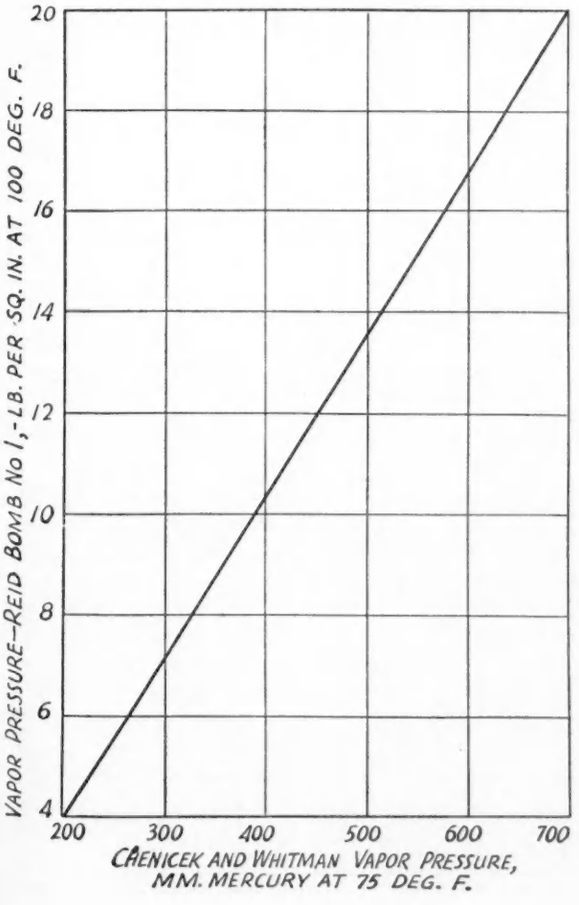
Tank paint.

Degree of filling.

In the past many test results have been compared on bases such as "gasoline—summer exposure," or "vapor pressure (Reid) in pounds per square inch at 100° F.," without regard to the temperature of the oil under test. It, therefore, appeared possible that comparisons were being drawn between tests that were not really comparable; and this led to the selection, as a basis for this study, of a factor which is believed to be the most comprehensive of any so far used in this work.

FIGURE 2

Comparison of Vapor-Pressure Determinations by Reid and Chenicek and Whitman Methods.



This factor is "vapor pressure of oil at average temperature of oil in tank." Vapor pressure was chosen because it is the basic cause of evaporation; while correction to the oil temperature practically eliminates from consideration all variables of weather, tank size, and painting. By presenting a separate curve for each, variables of roof and vent construction, vent-valve pressure setting, and degree of filling (for cone-roof tanks) can be handled easily.

It is recognized that the volumetric magnitude of breathing losses from standing storage depends on the variation of temperature in the tank vapor space, which is in turn dependent principally on the amount and intensity of direct solar radiation falling on the tank. At the same time, however, the heat input to the body of oil in the tank—which enters largely through the tank shell—is also dependent principally on solar radiation. It is, therefore, believed that variations in conditions affecting the volume of breathing losses will be reflected in temperature changes in the body of oil in the tank and that, as a consequence, the factor selected represents a logical basis of comparison for tests of sufficient duration that brief extreme local variations will not overshadow normal average conditions. It is true that hypothetical conditions could be assumed where the factor selected would not hold, but it is felt to be adequate for actual field conditions.

Evidence that the factor chosen includes variables of weather, tank size, and painting is illustrated in Figure 1, "Relation of Atmospheric Temperature to Temperature of Standing Oil in Steel Storage Tanks," wherein the plotted points include tanks from 15 to 97 percent full; from 1500- to 85,000-barrel capacity, with the roof constructions noted thereon—in tests of from 5 to 62 days' duration. With all these differences, the one curve that is plotted as the mean of all points will serve almost equally well for any group. This indicates that the major heat input to the oil in a tank is through the shell, and that roof construction or vapor-space volume has little effect on the way in which weather conditions affect the temperature of the oil. Thus, the oil temperature is seen to be affected by the same variables as the tank breathing—which confirms the logic of the selection of the factor chosen for comparisons.

For plotting the desired curves of evaporation losses, it was necessary that the test data should include data on vapor pressure and average oil temperature during the test. In some cases it was found that average atmospheric temperatures were available instead of oil temperatures—in which case values for the oil were estimated from Figure 1. In other cases only the location and time of the test were given, and average atmospheric temperatures were estimated from known data under approximately similar conditions, and the oil temperatures estimated therefrom.

It was desired to plot the curves against a standard method of vapor-pressure measurement—Reid at 100 deg. F. being chosen. This required a correlation between the Chenicek and Whitman and the Reid values—which was determined to be, as shown in Figure 2, by correlation with secondary data available in Shell Oil Company files.

(*Continued next page*)

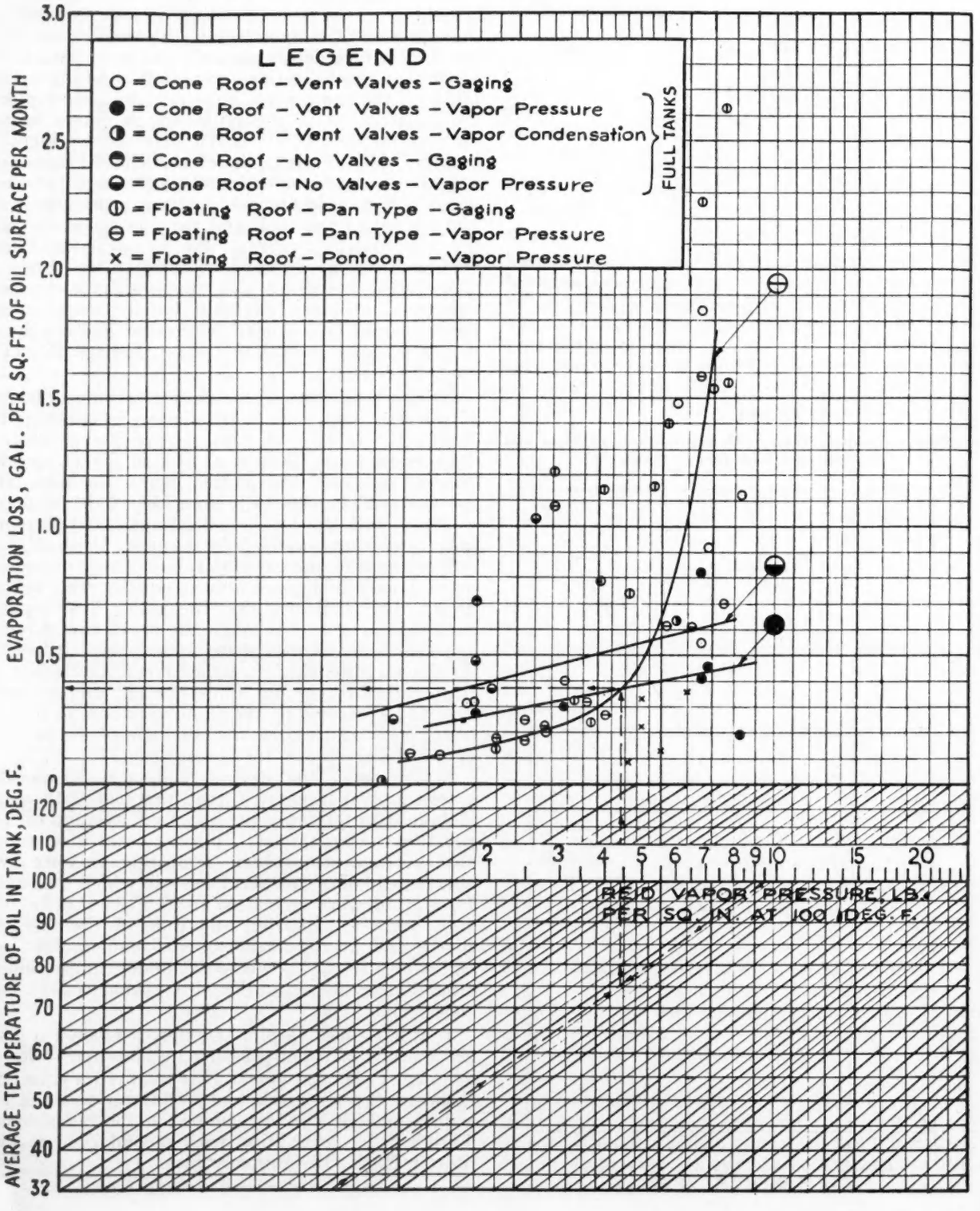
Results

For the presentation of this study it was desired to plot the following curves:

1. Evaporation loss from standing storage for:
   a. Full cone-roof tanks without vent valves.
   b. Full cone-roof tanks with vent valves.
   c. Full cone-roof tanks with vent valves, and insulated or water-cooled roofs.
   d. Tanks with pan-type floating roofs.
   e. Tanks with pontoon-type floating roofs.
   f. Full tanks with breather roofs.
2. Variation of evaporation loss from cone-roof tanks with degree of filling.
3. Variation of evaporation loss from cone-roof tanks with increase of vent-valve operating pressure.
4. Evaporation loss from cone-roof tanks due to pumping in.

Available data were inadequate to plot curves for items (1-c), (2), and (3) above; while a curve for (1-f) was omitted, as the data showed that breathing

FIGURE 3
Evaporation Loss of Petroleum Oils from Standing Storage in Steel Tanks.

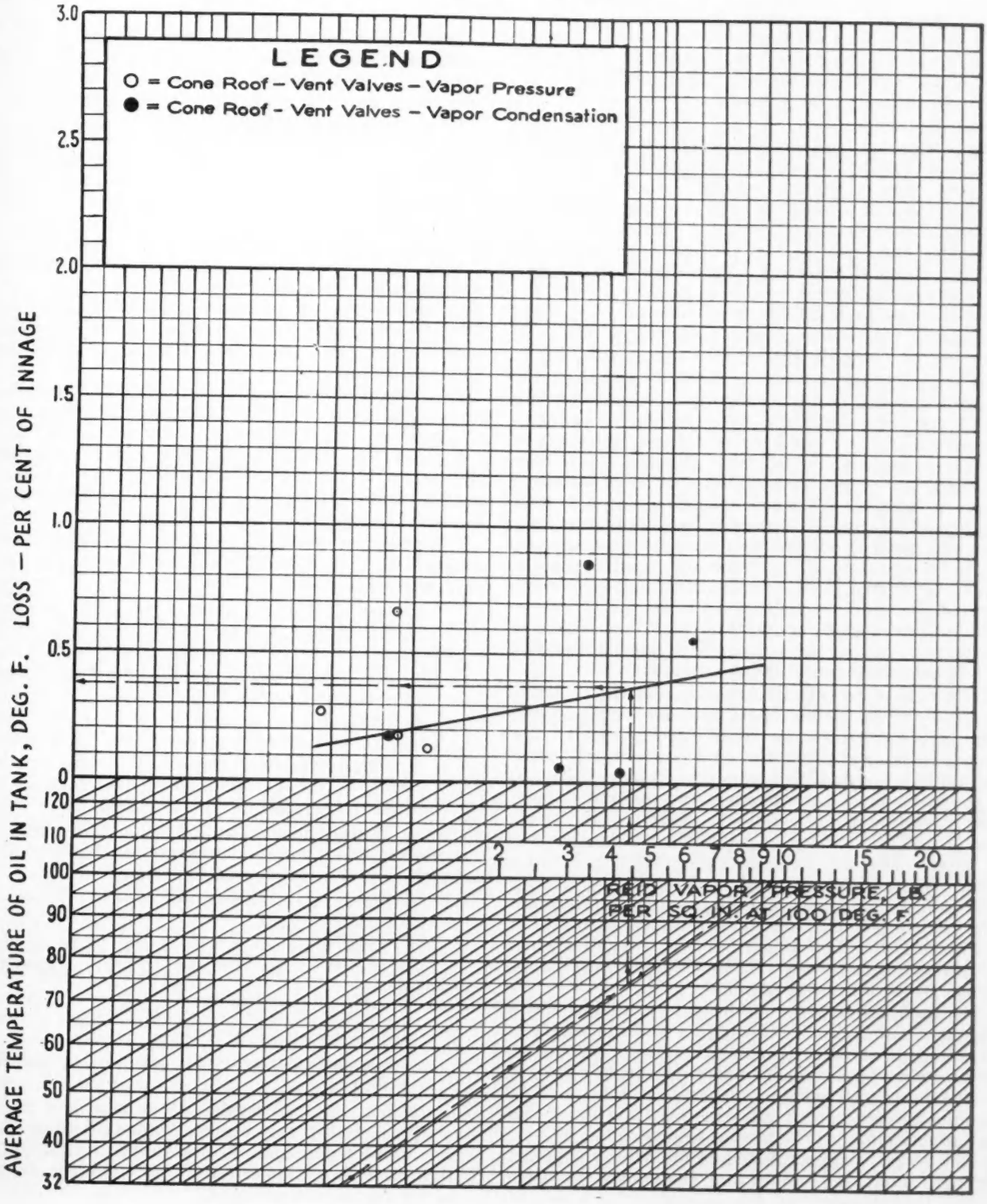

LEGEND
O = Cone Roof – Vent Valves – Gaging
● = Cone Roof – Vent Valves – Vapor Pressure
◑ = Cone Roof – Vent Valves – Vapor Condensation
◓ = Cone Roof – No Valves – Gaging
◒ = Cone Roof – No Valves – Vapor Pressure
⊕ = Floating Roof – Pan Type – Gaging
⊖ = Floating Roof – Pan Type – Vapor Pressure
x = Floating Roof – Pontoon – Vapor Pressure
FULL TANKS
EVAPORATION LOSS, GAL. PER SQ. FT. OF OIL SURFACE PER MONTH
3.0
2.5
2.0
1.5
1.0
0.5
0
AVERAGE TEMPERATURE OF OIL IN TANK, DEG. F.
120
110
100
90
80
70
60
50
40
32
2 3 4 5 6 7 8 9 10 15 20
REID VAPOR PRESSURE, LBS. PER SQ. IN. AT 100 DEG. F.

losses from breather roof tanks standing full was negligible.

The remaining data under item (1) are presented in Figure 3, "Evaporation Loss of Petroleum Oils from Standing Storage in Steel Tanks"—losses being given in terms of "gallons per square foot of oil surface per month," which factor was selected as being most desirable from the standpoint of correlating test results from tanks of different sizes. This chart is entered with a reading of vapor pressure on the Reid scale, moving along the inclined guide lines (which are based on the Cox curves of vapor pressures) to an intersection with the proper horizontal temperature line, which corrects the vapor pressure to the temperature of the oil in the tank, and thence vertically to an intersection with the curve for the spe-

FIGURE 4

Evaporation Loss of Petroleum Oils from Pumping into Steel Tanks.



cific case in hand, reading the answer along the left margin of the chart. The dashed lines on the chart are an example.

On this chart, curves are given for full cone-roof tanks with and without vent valves, and for pan-type floating-roof tanks. Points have been plotted for pontoon-type floating-roof tanks; but no curve was drawn, as the points were too few.

It is significant to note the rapid rise of the curve for pan-type floating roofs with increase in vapor pressure. This checks the observations of several investigators that high losses were sustained with volatile oils stored under such roofs when exposed to direct sunlight, due to boiling of the oil in contact with the roof. The advatage of the pontoon type of floating roof in this respect is illustrated by the position of the points for the pontoon-type roofs in relation to the curve for the pan-type roofs.

The data under item (4) are shown in Figure 4, "Evaporation Loss of Petroleum Oils from Pumping into Steel Tanks." Results are presented in terms of "percent loss of innage volume." Test results on which to base this curve are rather meager, and also somewhat inconsistent. They give reasonable justification for the lower end of the curve shown, while the rest of it was drawn at such a slope that the loss with increasing vapor pressure would vary in the same ratio as the loss from standing storage in cone-roof tanks with vent valves. The method of using this chart is the same as that given for Figure 3.

In studying and criticizing these charts, it should be kept in mind that the data upon which they are based are derived from a large number of sources, among which there has been little or no coordination of test procedures or methods. Results have been taken at face value, without knowledge or means of determining their inherent accuracy—except that for the actual location of curves tests by gauging have been discounted in favor of tests by vapor-pressure methods, with decided preference being given to those conducted by the Chenicek and Whitman method. The curves are believed to represent reasonable values based upon the present volume of adequate data. They are, of course, subject to revision as additional data may become available.

It is desired to call attention also to the fact that the data on which this report is based are all derived from oils of relatively low Reid vapor pressures, and that it is probable that the curves presented would not apply to oils of high vapor pressures. With oils of the latter type, tank temperature increases due to solar radiation might reach the boiling point of the product, so that further heat input would be absorbed as latent heat of evaporation—resulting in high losses, without an observed increase in the oil temperature. In this case the linear relation between average atmospheric and oil temperatures indicated in Figure 1 would no longer hold. Test data on which to establish satisfactory relationships for high-vapor-pressure oils are not available.

As noted above, none of the data available during this study presented information on the effect of increased vent-valve pressure setting—all results herein being applicable to valve operating pressures of the order of 1 inch to 1½ inches of water, conforming to common practice in this country. In foreign practice, tank pressures as high as 20 cm. (8 in.) of water are being employed—from which appreciable reductions in evaporation losses are reported. While the majority of the larger tankage in this country is not suitable for such operating conditions, many of our smaller tanks could withstand them; and for these, investigations of the economics of higher operating pressures should be profitable. The current expansion of low-pressure storage in containers of special shapes designed as pressure vessels may be considered an indication that the economics of pressure storage are fundamentally sound.

This study has shown very definitely the need for uniform methods for conducting tank-evaporation-loss tests to insure that the results of different investigators shall be comparable for common benefit. A suggested procedure is outlined in the appendix hereto.

Appendix

Accuracy of individual tests requires that test data be taken at such times and by such means that test conditions shall be as nearly uniform as possible. Tank conditions are least uniform during daylight hours due to temperature effects, such as expansion and the creation of convection currents, caused by solar radiation on one side of a tank only. The ability to correlate test data secured from different sources is dependent on the use of the same methods and procedure by all investigators.

These requirements can be met by adherence to the following principles:

1. Take all oil samples, and make all gagings between the hours of 2:30 and 5:30 a.m., which is the period when greatest uniformity of atmospheric and tank conditions exists.

2. Conduct all evaporation-loss tests by the vapor-pressure method, using the apparatus and procedure of Chenicek and Whitman.

3. Take all samples in accordance with the procedure recommended by Chenicek and Whitman, until a better method is developed and proved—when it should be adopted.

4. Every test should include the following data in addition to the Chenicek and Whitman vapor-pressure analysis:

   a. Daily record of average tank temperature, established by at least three readings spaced throughout the depth of oil in the tank. Whenever possible, readings should be taken at more than one point in the tank.

   b. Daily record of average atmospheric temperature and extreme temperature range.

   c. Vapor-pressure values in the Reid scale to provide better correlation between that scale and the Chenicek and Whitman method.

   d. Initial and final tank gagings as a check on the results by vapor-pressure methods, and to indicate the magnitude of leakage losses.

   e. Dates of start and finish of test, and regional location thereof.

   f. Tank dimensions (including slope of cone roofs), kind of roof and roof appurtenances, and painting.

   g. Vent-valve operating pressures.

   h. Degree of filling of tank.

   i. For tests on losses by pumping in, the rate of filling.

5. Present all test results for comparison on the basis presented in this report, "vapor pressure of oil at average temperature of oil in tank," until additional data may show this criterion to be inadequate, and a better factor is developed.

CALCULATION OF VENTING REQUIREMENTS FOR LOW-PRESSURE

Oil Storage Tanks

By LOUIS BOSA,
Shand and Jurs Company

Presented before the Nineteenth Annual Meeting, American Petroleum Institute, Division of Production, Chicago, November 18, 1938.

IT has become rather general practice in the petroleum industry to use gas-tight tanks for the storage of the more volatile crude and refined products, equipping them with pressure and vacuum breather valves as a means of minimizing vapor losses due to thermal breathing or displacement by oil movements into or out of the tanks.

Manufacturers of venting equipment furnish capacity curves for their valves, from which a user can select the number and size of valves required for a given installation—provided he can determine the volumetric breathing requirement for that installation. Most users have established their own methods for computing such volumetric requirements but, unfortunately, there is little agreement among the various methods and factors employed. This became very evident in a recent investigation conducted in cooperation with members of the Institute's Committee on the Standardization of Steel Tanks for Oil Storage and with members of the Institute's committees on fire prevention—which investigation also brought to light the desire of a large number of oil companies to work out some standard method of calculation, flexible enough to fit varying conditions, economical from the standpoint of the amount of venting equipment required, yet having at the same time a sufficient margin of safety to recommend it as a *safe* standard.

As the initial step in the investigation to which we have referred, a questionnaire was sent to a number of the larger oil companies in regard to the methods used by them for the calculation of venting requirements. The information received was tabulated and studied, and then there was worked out a proposed standard method considering both available experimental data and current practice.

But, before reviewing the results of this investigation and the proposed standard method, let us state briefly the main factors involved in the problem of tank venting.

Evaporation losses can be placed in three classifications, viz.: losses due to daily temperature variations; filling losses, inherent to the operations of filling and emptying; and windage losses due to the circulation of air in and out of a tank if there are cracks in the roof seams, if the roof openings are not vapor-tight, or if the tank is equipped with free vents.

In ordinary cone-roof tanks breathing and filling losses cannot be prevented entirely, but the windage losses and those due to minor temperature and barometric variations can be eliminated by the use of pressure and vacuum breather valves—provided, of course, the tank is otherwise made vapor-tight. The potential savings are of sufficient magnitude that they cannot be disregarded. These savings can be accomplished even with the usual small pressure and vacuum settings of 1 inch of water, and justify the trend toward slightly higher settings whenever the type of tank construction permits. There is no doubt that pressure and vacuum breathers have demonstrated their economic justification in the field of low-pressure storage.

Our immediate concern is the problem of the proper determination of the number and size of breathers to be used in any particular installation. Experience shows that insufficient venting capacity may lead to unsatisfactory operating conditions, and may defeat the purpose of reducing the evaporation losses for which pressure and vacuum breathers are installed. Insufficient breathing capacity may, indeed, lead to the development of leaks in the seams of the roof by allowing the internal pressure to build up to such an extent that the plates from the rafters are lifted up; or it may result in the collapse of the roof, or of the upper ring of the tank, because of excessive vacuum within the tank. The latter has not been an uncommon occurrence.

In the proper determination of breathing requirement we have a dual problem: one phase is the determination of the required breathing capacity; the other is the choice of the equipment that will make available, at a certain pressure and vacuum, such breathing capacity.

The required breathing capacity depends upon a number of well-recognized factors. Under normal breathing conditions the principal factors involved are:

a. The volume of the vapor space.

b. The vapor pressure of the liquid stored.

c. The rates of filling and emptying, or pumping rates.

d. The maximum rates of temperature rise or temperature drop of the tank vapor space and of the liquid surface.

We are omitting purposely two other factors, viz.: vapor efflux, due to boiling; and emergency venting, due to exposure fire—because the first must be considered only in the case of high vapor-pressure products, for which cone-roof tanks are not the most suitable; and the second is usually dealt with separately, and taken care of by means other than equipment of the type used for normal breathing requirements.

It should be evident—and it has been shown experi-

TABLE 1

1	2	3	4	5	6	7
			Basis for Venting-Requirement Calculations			
Company	Location of Tanks	General Considerations	Temperature Change (° F.)	Pumping In and Out	Others	Do They Use Safety Vents as Distinct from Breather Valves?
A	Pacific Coast	Use charts based on tank vapor-space content of air only. Vapor pressure is not taken into consideration because of wide range in characteristics of different oils stored or handled. Factor of 2 applied to assumed temperature change takes care of the higher values of vapor pressure with the exception of very high-gravity gasolines, which are treated as a special problem.	Base.....30 Multiplier.....2 Total.....60	Maximum pumping rate without multiplier.	Emergency venting is taken care of, preferably by the use of separate liquid-seal emergency valves. *	YES (Liquid-seal)
B	Atlantic Coast and Gulf Coast	Breathing due to temperature changes is figured basically on a 40-deg. rise of temperature in the vapor space with the tank half full. A 60-percent increase is allowed for evaporation due to this rise in temperature. All this is equivalent to a required breathing capacity of 6.6 percent of the nominal tank volume. Vapor pressure not taken into account. Use free vents where no material vaporization takes place.	Base.....40 Multiplier.....1.6 Total.....65 (Applied to one-half the tank volume, equivalent to 6.6 percent **total** tank	Maximum pumping rate. Multiplier 2, to allow for emergency venting, unusual vapor surges, etc.		NO Believe breathers have sufficient margin of safety. Rely on foam system of fire protection.
C	General	The basic temperature change is chosen according to tank location. Vapor pressure not taken into account.	Pacific Coast.....20 Great Lakes.....25 Atlantic Coast....30 Salt Lake.....30 Mid-Continent....40 Rocky Mountains..40 Mexico.....40 Gulf Coast.....5 (No multiplier)	Maximum pumping rate without multiplier.		NO
D	Gulf Coast	Venting equipment is based on the in-breathing rather than out-breathing; tanks are, therefore, equipped with units of the size and number necessary to permit the maximum in-breathing rate without creating excessive vacuum (maximum allowable, 4 in. of water). Theory based on actual records of temperature changes. Vapor pressure not taken into account.	Use formula C=3.6 S (S=surface of tank enclosing vapor space). Based on maximum recorded temperature drop of 7 deg. in 9.08 min.	Maximum pumping rate without multiplier.	Vent sizes based on in-breathing rather than out-breathing, as with tank spacing used exposure fire would not create a temperature rise comparable to assumed temperature drop.	NO
E	Mid Continent and Great Lakes	Have discontinued the use of breather valves, because do not believe that 1 oz. to 2 oz. pressure is sufficient to save enough evaporation loss to pay for the extra cost of the fittings. Most of the new tanks are equipped with free vents and flame-arrester units.				
F	Pacific Coast	Provide for a classification of oils according to their vapor pressure. Class I: Vapor pressure in excess of 14 lb. per sq. in. Class II: Vapor pressure between 2 and 14 lb. per sq. in. Class III: Vapor pressure less than 2 lb. per sq. in. (Vapor pressure is Reid at 100 deg. F., or pressure at stored temperature if this exceeds 100 deg. F.)	Base.....20 Multiplier.....5 Total.....100 (1,100 cu. ft. of air per hour per each 1,000 bbl. of tank capacity.)	Pumping-in rate with multiplier 2. Pumping-out rate without multiplier.	**Class I:** Relief capacity, either pressure or vacuum, equals 100 percent of sum of pumping and temperature breathing. **Class II:** Relief capacity, either pressure or vacuum, equals 75 percent of sum of pumping and temperature breathing. **Class III:** Relief capacity, either pressure or vacuum, equals 50 percent of sum of pumping and temperature breathing. (Open vents used.)	
G	Atlantic Coast Gulf Coast Great Lakes	Base the capacity of vent valves only on the breathing due to pumping in and out, on an assumption that such capacity is more than ample for breathing due to temperature changes. The multiplier 2 used for the pumping rate is based on extensive series of tests. (See paper in Sect. II of the *Proceedings of the Ninth Annual Meeting of the American Petroleum Institute*, January 3, 1929.)	Not taken into account.	Pumping rate with multiplier 2.		NO
H	General	Do not state what method is used for the determination of the required breathing capacity due to temperature changes and to pumping. Manufacture own valves.			Assume a 60-deg. temperature rise due to exposure fire with tank almost empty.	
L	Mid Continent	For the determination of the capacity required for pressure venting, take into consideration also the area of the oil surface.	Base.....20 (No multiplier)	Pumping rate without multiplier.	Add 3 cu. ft. for each square foot of oil surface in calculation of required pressure-venting capacity.	
M	Atlantic Coast and Gulf Coast	Venting calculations based on observed maximum rate of temperature drop of 1 deg. per min. in tank vapor space during thunder shower on hot summer day.	On vacuum side, 1 deg. F. per min. On pressure side, ½ deg. F. per min.	Pumping rate without multiplier.	Emergency venting is taken care of by partly weakening the joint between roof and shell. †	NO

TABLE 1

8	9	10	11	12	13	14
		Four Examples of Application of the Various Methods				
Do They Use Flame Arresters?	**Accepted Available Relief-Valve Capacities**	Tank diameter	144 ft.	120 ft.	102 ft.	60 ft.
		Tank height	46 ft. 1¾ in.	40 ft. 7½ in.	29 ft. 3¼ in.	40 ft. 10¼ in.
		Tank capacity, bbl.	134,000	82,000	42,500	20,500
		Tank capacity, cu. ft.	750,000	460,000	238,000	115,000
		Pumping rate, bbl. per hour	4,000	2,000	2,000	1,000
		Pumping rate, cu. ft. per hour	22,400	11,200	11,200	5,600
On vapor recovery only.	Manufacturer's rating at an operating pressure of ¾ oz. per sq. in.	Temperature breathing	90,000	56,000	29,000	14,000
		Pumping	22,400	11,200	11,200	5,600
		Total required capacity	112,400	67,200	40,200	19,600
		Valves required (capacity rating at ¾ oz. per sq. in.)	Two 8-in.	Two 6-in.	One 6-in.	One 4-in.
		(Add to these the liquid-seal emergency vents.)				
YES, but omit them on high-flash-point material.	Manufacturer's rating. For flame-arrester combination units, manufacturer's rating reduced 20 percent to allow for some clogging. Available capacity chosen at following pressures: Roof Pitch (Inches Per Foot) 1½: Valve Setting Pressure 1.15, Vacuum 0.5; Available Vent Capacity (Ozs. per Sq. In.) 3, 1.75. <1½: Pressure 0.5, Vacuum 0.5; 1.5, 1	Temperature breathing	49,500	30,400	15,700	7,600
		Pumping	44,800	22,400	22,400	11,200
		Total required capacity	94,300	52,800	38,100	18,800
		Valves required (capacity rating at 1¾-oz. vacuum)	One 8-in.	One 6-in.	One 6-in.	One 4-in.
YES, but omit them on high-flash-point material.	Assume for ½-oz. pressure setting: For free vents, 70 percent of 12-in. pipe-nipple capacity. For combination vent and flame-arrester, 35 percent of 12-in. pipe-nipple capacity. A correction is made to allow for deviations in manufacturers' capacity charts from the 100-percent efficient pipe nipple. (Nipple capacity chosen at 1 oz.)	PACIFIC COAST: Temperature breathing	30,000	18,400	9,500	4,600
		PACIFIC COAST: Pumping	22,400	11,200	11,200	5,600
		PACIFIC COAST: Total required capacity	52,400	29,600	20,700	10,200
		PACIFIC COAST: Valves required (at 70-percent capacity, 12-in. pipe nipple)	One 8-in.	One 6-in.	One 6-in.	One 4-in.
		GULF COAST: Temperature breathing	75,000	46,000	23,800	11,500
		GULF COAST: Pumping	22,400	11,200	11,200	5,600
		GULF COAST: Total required capacity	97,400	57,200	35,000	17,100
		GULF COAST: Valves required	One 10-in.	One 8-in.	One 6-in.	One 6-in.
YES	Manufacturer's rating, but doubling pressure drop through flame arrester to allow for some clogging. No such correction, however, is made for tanks in sales service handling clean oil. Choose capacity at vacuum of not more than 4 in. of water.	Tank-shell area, S =	37,000	27,000	17,500	10,500
		C = 3.6 S	133,000	97,000	63,000	38,000
		Pumping	22,400	11,200	11,200	5,600
		Total required capacity	155,400	108,200	74,200	43,600
		Valves required (capacity at vacuum rating of 4 in. of water)	One 10-in.	One 8-in.	One 8-in.	One 6-in.
YES: believe main value of most of venting units in market lies in their flame arresters. (See "General Considerations.")						
On vapor recovery only.	For the purpose of selecting the proper size and number of vent connections, assume that the flow capacities of individual tank connections are as follows: Vent Diameter (Inches) 4, 6, 8; Air (Cu. Ft. per Hr.) 15,000, 35,000, 65,000	(Class II) (Selection according to pumping-in breathing.)				
		Temperature breathing	110,000	67,600	35,000	17,000
		Pumping-in breathing	33,600	16,800	16,800	8,400
		Total required capacity	143,600	84,400	51,800	25,400
		Valves required (See Column 9)	Two 8-in. and One 4-in.	One 8-in. and One 4-in.	One 8-in.	One 6-in.
YES	Manufacturer's rating. Pressure not stated.	Temperature breathing	.....	.....	.....	.....
		Pumping	44,800	22,400	22,400	11,200
		Total required capacity	44,800	22,400	22,400	11,200
		Valves required (capacity rating at ¾-oz. pressure)	One 8-in.	One 6-in.	One 6-in.	One 4-in.
NO	Manufacture their own valves; capacity determined by test.					
?	?	Temperature breathing	30,000	18,400	9,500	4,600
		Pumping	22,400	11,200	11,200	5,600
		Surface evaporation	49,000	34,000	24,500	8,500
		Total required capacity	101,400	63,600	45,200	18,700
		Valves required (rating at ¾-oz. pressure)	Two 8-in.	Two 6-in.	One 8-in.	One 4-in.
?	Own tests have shown capacity curves furnished by manufacturer to be correct. Available vent capacity chosen at ½ oz., pressure or vacuum. (Note: With the usual valve setting of ½ oz., the capacity at ½ oz. is 0, or nearly so.)	Temperature breathing (vacuum)	90,000	55,300	28,600	13,800
		Pumping-out breathing	22,400	11,200	11,200	5,600
		Total required capacity	112,400	66,500	39,800	19,400
		Valves required (rating at ¾-oz. vacuum) ?	Three 8-in.	Two 8-in.	One 8-in.	One 6-in.

(Table 1 continued on next page)

TABLE 1—Continued

1	2	3	4	5	6	7
			Basis for Venting-Requirement Calculations			
Company	Location of Tanks	General Considerations	Temperature Change (° F.)	Pumping In and Out	Others	Do They Use Safety Vents as Distinct from Breather Valves?
N	Pacific Coast	Maximum daily vapor-space temperature range is deduced from experimental chart in function of the maximum daily atmospheric-temperature range for same location. Total daily breathing is then calculated on the basis of thermal expansion and vapor-pressure variation. Maximum rate of breathing (required capacity) is deduced from experimental curve of total breathing against time.	See "General Considerations."	Pumping rate without multiplier.		YES (Liquid-seal.)

* The required capacity for emergency venting is determined on the basis of the expansion of the tank vapors due to the heat input through one-half of the tank shell for an arbitrary difference in temperature between outside and inside of the tank. The emergency vents, of the liquid-seal type, are set at a pressure slightly higher than that of the breather valves, but well under the allowable working pressure of the tank (usually ¾ oz. per sq. in.).

† In cases of uninsulated pressure storage, the required vent capacity due to exposure fire is based on the vapor expansion calculated on the basis of a heat input of 8,000 Btu. per sq. ft. per hour through the exposed tank-shell area. This is the shell area up to the 20 ft. elevation for vertical cylindrical drums and for horizontal cylindrical or spherical vessels whose maximum diameter is more than 20 ft. from the ground; but, if the maximum diameter of the last two is less than 20 ft. from the ground, the exposed surface is the shell area up to the maximum diameter.

(Table 1 continued on next page)

mentally—that, for a given liquid vapor pressure and pumping rate, the highest rate of breathing will take place under the combined conditions of a tank being almost empty and subjected to the most rapid temperature rise or temperature drop. Specifically, for what we may call the pressure breather requirements of a tank, the most adverse condition will be brought about by the most rapid rise in the temperature of the vapor space occurring when the almost empty tank is being filled at the maximum rate. In the case of "vacuum breathing," the most severe combination of adverse conditions is represented by a rapid drop of the temperature of the vapor space occurring in an almost empty tank which is being emptied at the maximum rate.

As to the importance of vapor pressure in the phenomenon of breathing, it can be shown theoretically—and it has been observed in actual tests—that the amount of breathing increases with increased liquid vapor pressure.

In the choice of the venting equipment we are usually guided by capacity curves, either computed or determined experimentally and furnished by the equipment manufacturer.

Present Methods for the Calculation of Venting Requirements

While the foregoing represent what are felt to be basic factors in the problem of tank venting, and which have been, on the whole, considered by every company that has established its own rules for the determination of venting requirements, their manner of application has varied widely, as can be seen from a study of Table 1.

In Table 1 is condensed the information received from a number of the larger oil companies regarding the methods which they use for the calculation of breather requirements. Even a cursory examination of this table shows that the current practice in breather-requirement calculations, although based in general on the same fundamental principles, leads to quantitative interpretations quite at variance with each other. This is brought out by the examples shown in columns 11, 12, 13, and 14, where four cases have been worked numerically on the basis of information received. The choice of the size and number of breathers required has been based on a set of arbitrary capacity curves which represent a fair average of capacity curves published by various manufacturers (Figure 1).

Every effort has been made to apply correctly the methods of calculation as outlined in the communications received from the various oil companies; but it is possible that in one or two cases the numerical application is not correct, because the proper interpretation of the particular method was doubtful.

Certain other considerations which became available in assembling data for Table 1 are of interest. Only one of the companies listed holds the opinion that the savings in evaporation losses, considered possible with the installation of pressure- and vacuum-relief valves, do not compensate for the extra cost of the fittings over that of open free vents.

One of the formulas used gives the required capacity not in function of tank volume, but in function of shell area. This is interesting: because, other conditions being equal, the volume of breathing, in proportion to the volume of the tank, may be expected to be greater for a small tank than for a large one.

In another case no account is taken of breathing due to temperature changes—it being assumed that the capacity calculated on the basis of the maximum pumping rate, multiplied by 2, is sufficient to take care of breathing under all other conditions.

Except for the foregoing two cases, all companies of the group examined base their capacity calculations on thermal expansion due to temperature changes, and on the pumping rate.

In column 4 are tabulated data relative to the assumed rate of temperature change, which is used in the computation of the volumetric variation of the vapors, considered as perfect gases. No fair comparison can be made regarding the hourly rates of temperature variations assumed in the different methods as a basis for the calculation of temperature breathing. This hourly rate, including the multiplier, if any, varies from 20 degrees to 100 degrees, and various factors might be included in it as, for instance, geographic location, vapor pressure, and general safety factor. Only two companies state specifically that the basic rate of temperature changes

TABLE 1—Continued

8	9	10	11	12	13	14
		Four Examples of Application of the Various Methods				
Do They Use Flame Arresters?	**Accepted Available Relief-Valve Capacities**	Tank diameter	144 ft.	120 ft.	102 ft.	60 ft.
		Tank height	46 ft. 1¾ in.	40 ft. 7½ in.	29 ft. 3¼ in.	40 ft. 10¼ in.
		Tank capacity, bbl.	134,000	82,000	42,500	20,500
		Tank capacity, cu. ft.	750,000	460,000	238,000	115,000
		Pumping rate, bbl. per hour	4,000	2,000	2,000	1,000
		Pumping rate, cu. ft. per hour	22,400	11,200	11,200	5,600
NO	Choice of number and size of valves is made from chart based on method outlined in column 3 and on capacity tests on all valve sizes. This chart is used only for tanks containing products well below the boiling point when in storage. The valve sizes shown in columns 11, 12, 13 and 14 were chosen from such a chart.		Two 8-in.	One 8-in.	One 8-in.	One 6-in.
		Examples of Application of Proposed Standard Method				
		Reid vapor pressure = 5 lb. — Thermal pressure breathing	48,000	29,000	16,000	7,500
		Reid vapor pressure = 5 lb. — Pumping-in breathing	25,500	12,800	12,800	6,200
		Rate of temperature rise: 25 deg. F. — Capacity required on pressure side	73,500	41,800	28,800	13,700
		Rate of temperature rise: 25 deg. F. — Thermal vacuum breathing	53,000	33,000	17,000	8,100
		Rate of temperature rise: 25 deg. F. — Pumping-out breathing	22,500	11,200	11,200	5,700
		Rate of temperature drop: 35 deg. F. — Capacity required on vacuum side	75,500	44,200	28,200	13,800
		Rate of temperature drop: 35 deg. F. — Breathers required	One 10-in.	One 8-in.	One 6-in. One 4-in.	One 6-in.
		Rate of temperature drop: 35 deg. F. — Determined by	Either	Vacuum condition	Vacuum condition	Vacuum condition
		Reid vapor pressure = 12 lb. — Thermal pressure breathing	118,000	76,000	40,000	19,500
		Reid vapor pressure = 12 lb. — Pumping-in breathing	28,500	14,500	14,500	7,100
		Rate of temperature rise: 35 deg. F. — Capacity required on pressure side	146,500	90,500	54,500	26,600
		Rate of temperature rise: 35 deg. F. — Thermal vacuum breathing	109,000	68,000	36,000	17,500
		Rate of temperature rise: 35 deg. F. — Pumping-out breathing	22,500	11,200	11,200	5,700
		Rate of temperature drop: 50 deg. F. — Capacity required on vacuum side	131,500	79,200	47,200	23,200
		Rate of temperature drop: 50 deg. F. — Breathers required	One 10-in.	One 10-in.	One 8-in.	One 6-in.
		Rate of temperature drop: 50 deg. F. — Determined by	One 8-in. Pressure condition	Either	Vacuum condition	Either

is to be chosen according to the geographical location of the tank.

As is shown in column 5 covering breathing due to pumping, a multiplier of 2 for the maximum pumping rate is used by some of the companies (not the majority) to allow for unusual vapor surges or otherwise as a general safety factor, or to take into account conditions that have nothing to do with pumping.

A classification according to the vapor pressure of the liquid stored is made in only one of the methods analyzed. This does not necessarily mean that the vapor pressure has not been taken into consideration in the other methods. It means, undoubtedly, that the methods have been based on the highest possible value of vapor pressure of the liquid to be stored, or no differentiation was thought worthwhile between high or low vapor pressures.

In only three instances a definite statement has been made with reference to the distinction to be made between pressure and vacuum operation; and in one of these the breather requirements are determined according to the vacuum condition.

For the determination of breather sizes, the calculation of the capacity required is only one side of the problem. The available capacity is a function not only of breather size, but also of pressure (or vacuum) setting, and of the pressure in the tank. It will be noted (Table 1, column 9) that the available capacity is chosen according to varying values of pressure (or vacuum) which in most cases are evidently selected on a basis of having a sufficient margin of safety.

Finally, nowhere is there any direct mention of the necessary reduction to standard air of the volume of air and vapor mixture going through the pressure-relief valve, which has a density greater than 1 (air=1). This reduction is necessary in view of the fact that the rated capacities of breather valves are given in volumes of standard air.

It is not surprising that the four numerical examples worked out in Table 1 give variations up to 350 percent in the required capacities; and, if the number and size of breathers required do not show a similar range, this is due in part to different criteria used in the choice of the available capacity, and in part to the fact that the step in capacity between one size breather and the next is so large that it allows great flexibility in the calculation of the required capacity.

Proposed Standard Method for the Calculation of Venting Requirements

From the analysis of the data contained in Table 1, it appears that the disagreement existing among the various methods is due principally to the uncertainty regarding the numerical values to be assigned to the factors involved. This suggests immediately that a standard method be proposed which will be based, as far as practicable, on sound theoretical considerations, yet giving results which will not show too great variance from conditions that experience to date has shown to be reasonably satisfactory. In order to make it acceptable generally it must have sufficient flexibility to take into account the largest possible range of actual conditions, and it must also include a sufficient margin of safety so that it can be accepted as a really safe standard. Flexibility is desirable if economy, as well as the safety of the installation, is to be achieved; as it is evident that the breather requirements of a tank containing a high vapor-pressure product are greater than those of a tank containing a material of low vapor pressure—while some differentiation should be made for the geographic location of the tank, taking into account the different rates of temperature changes.

Based on these general principles, a proposed stand-

ard has been evolved. The detailed derivation of this method is given in the appendix. The proposed standard is based on the following considerations:

a. For pressure, the required breathing capacity is taken as the sum of the thermal pressure breathing for the almost empty tank, due to highest probable rate of temperature rise, and of the breathing due to pumping in.

b. For vacuum, the required capacity is taken as the sum of the thermal vacuum breathing for the almost empty tank, due to the highest possible rate of temperature drop, and of the pumping-out rate.

c. The following factors are, therefore, pertinent and must be available for every study of breathing requirements:

1. The volume of the tank (capacity in barrels).
2. The Reid vapor pressure of the product stored (in pounds per square inch at 100° F.).
3. The maximum probable rates of temperature rise and temperature drop in the vapor space of the almost empty tank (in ° F. per hour).
4. The rates of filling and emptying (in barrels or cubic feet per hour).

The appended nomographic chart constructed on the basis of the proposed standard method affords a simple means for the computation of the required breathing capacity.

Thermal pressure breathing is determined on the left-hand side of the chart by projecting the intersection of the proper Reid vapor-pressure line with the vertical line corresponding to the selected rate of temperature rise onto the $\mathbf{K'}_{TP}$ scale; a line from this point to the tank capacity read off the **V** scale will intersect the $\mathbf{K'}_{TP} \times \mathbf{V}$ scale at a point which gives the required thermal pressure breathing.

The breathing due to pumping in is read off the $\mathbf{K'}_d \times \mathbf{D}_i$ scale, at the right-hand side of the chart, at the intersection with the line joining the proper points on the $\mathbf{K'}_d$ and **D** scales. The sum of the above two values is the required capacity on the pressure side, in cubic feet of free air per hour.

Similarly, the required capacity on the vacuum side is the sum of the thermal vacuum breathing and of the pumping-out rate. The first is read off the $\mathbf{K'}_{TV} \times \mathbf{V}$ scale in the center of the chart in a manner identical to that outlined for the thermal pressure breathing; the second is read, in cubic feet, directly off the **D** scale.

Particular attention is called to one exception, which is the case of small tanks with relatively high pumping-in rate—where the thermal pressure breathing might

Nomographic Chart

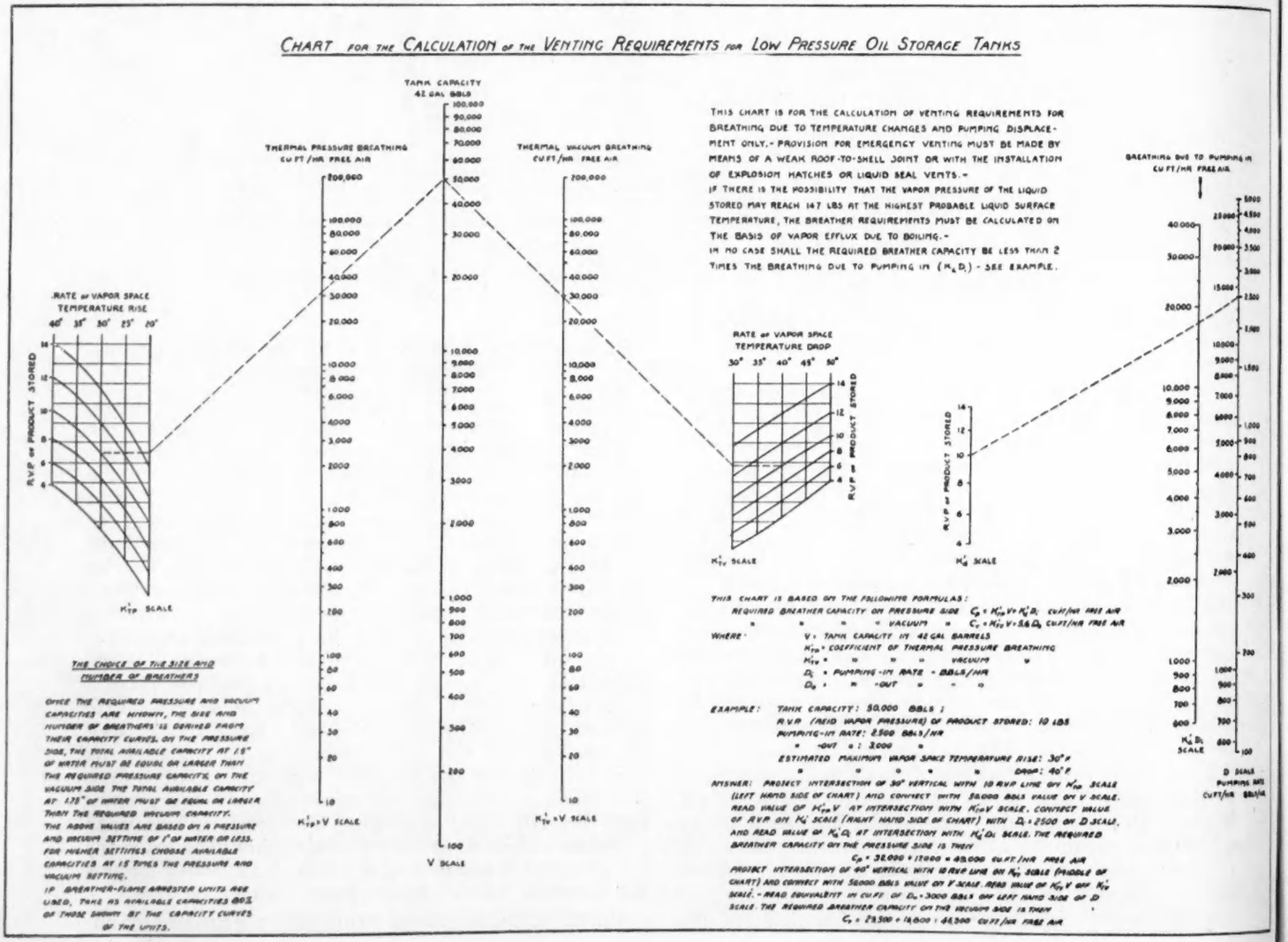


CHART FOR THE CALCULATION OF THE VENTING REQUIREMENTS FOR LOW PRESSURE OIL STORAGE TANKS
TANK CAPACITY 42 GAL BBLS
THERMAL PRESSURE BREATHING CU FT/HR FREE AIR
THERMAL VACUUM BREATHING CU FT/HR FREE AIR
BREATHING DUE TO PUMPING IN CU FT/HR FREE AIR
RATE OF VAPOR SPACE TEMPERATURE RISE
40° 35° 30° 25° 20°
RVP OF PRODUCT STORED
RATE OF VAPOR SPACE TEMPERATURE DROP
50° 45° 40° 35° 30°
V SCALE
D SCALE PUMPING IN CU FT/HR
THIS CHART IS FOR THE CALCULATION OF VENTING REQUIREMENTS FOR BREATHING DUE TO TEMPERATURE CHANGES AND PUMPING DISPLACEMENT ONLY.- PROVISION FOR EMERGENCY VENTING MUST BE MADE BY MEANS OF A WEAK ROOF-TO-SHELL JOINT OR WITH THE INSTALLATION OF EXPLOSION HATCHES OR LIQUID SEAL VENTS.-
IF THERE IS THE POSSIBILITY THAT THE VAPOR PRESSURE OF THE LIQUID STORED MAY REACH 147 LBS AT THE HIGHEST PROBABLE LIQUID SURFACE TEMPERATURE, THE BREATHER REQUIREMENTS MUST BE CALCULATED ON THE BASIS OF VAPOR EFFLUX DUE TO BOILING.-
IN NO CASE SHALL THE REQUIRED BREATHER CAPACITY BE LESS THAN 2 TIMES THE BREATHING DUE TO PUMPING IN ($K_d D_i$) - SEE EXAMPLE.
THE CHOICE OF THE SIZE AND NUMBER OF BREATHERS
ONCE THE REQUIRED PRESSURE AND VACUUM CAPACITIES ARE KNOWN, THE SIZE AND NUMBER OF BREATHERS IS DERIVED FROM THEIR CAPACITY CURVES. ON THE PRESSURE SIDE, THE TOTAL AVAILABLE CAPACITY AT 1.5" OF WATER MUST BE EQUAL OR LARGER THAN THE REQUIRED PRESSURE CAPACITY; ON THE VACUUM SIDE THE TOTAL AVAILABLE CAPACITY AT 1.75" OF WATER MUST BE EQUAL OR LARGER THAN THE REQUIRED VACUUM CAPACITY.
THE ABOVE VALUES ARE BASED ON A PRESSURE AND VACUUM SETTING OF 1" OF WATER OR LESS. FOR HIGHER SETTINGS CHOOSE AVAILABLE CAPACITIES AT 1.5 TIMES THE PRESSURE AND VACUUM SETTING.
IF BREATHER-FLAME ARRESTER UNITS ARE USED, TAKE AS AVAILABLE CAPACITIES 80% OF THOSE SHOWN BY THE CAPACITY CURVES OF THE UNITS.
THIS CHART IS BASED ON THE FOLLOWING FORMULAS:
REQUIRED BREATHER CAPACITY ON PRESSURE SIDE $C_p = K'_{TP} V + K'_d D_i$ CU FT/HR FREE AIR
" " " " VACUUM " $C_v = K'_{TV} V + 5.6 D_o$ CU FT/HR FREE AIR
WHERE: V = TANK CAPACITY IN 42 GAL BARRELS
K'_{TP} = COEFFICIENT OF THERMAL PRESSURE BREATHING
K'_{TV} = " " " VACUUM "
D_i = PUMPING-IN RATE - BBLS/HR
D_o = " -OUT " " "
EXAMPLE: TANK CAPACITY: 50,000 BBLS ;
R.V.P. (REID VAPOR PRESSURE) OF PRODUCT STORED: 10 LBS
PUMPING-IN RATE: 2500 BBLS/HR
" -OUT " : 3000 "
ESTIMATED MAXIMUM VAPOR SPACE TEMPERATURE RISE: 30°F
" " " " " DROP: 40°F
ANSWER: PROJECT INTERSECTION OF 30° VERTICAL WITH 10 RVP LINE ON K'_{TP} SCALE (LEFT HAND SIDE OF CHART) AND CONNECT WITH 50,000 BBLS VALUE ON V SCALE. READ VALUE OF $K'_{TP} V$ AT INTERSECTION WITH $K'_{TP} V$ SCALE. CONNECT VALUE OF R.V.P. ON K'_d SCALE (RIGHT HAND SIDE OF CHART) WITH D_i = 2500 ON D SCALE, AND READ VALUE OF $K'_d D_i$ AT INTERSECTION WITH $K'_d D_i$ SCALE. THE REQUIRED BREATHER CAPACITY ON THE PRESSURE SIDE IS THEN
C_p = 32,000 + 17,000 = 49,000 CU FT/HR FREE AIR
PROJECT INTERSECTION OF 40° VERTICAL WITH 10 RVP LINE ON K'_{TV} SCALE (MIDDLE OF CHART) AND CONNECT WITH 50,000 BBLS VALUE ON V SCALE. READ VALUE OF $K'_{TV} V$ ON K'_{TV} SCALE. - MEAD EQUIVALENT IN CU FT OF D_o = 3000 BBLS ON LEFT HAND SIDE OF D SCALE. THE REQUIRED BREATHER CAPACITY ON THE VACUUM SIDE IS THEN
C_v = 29,500 + 16,800 = 46,300 CU FT/HR FREE AIR

INTERNATIONAL TracTracTors . . . the Most Accessible, Most Easily Serviced Crawler Tractors on the Market

An International T-40 TracTracTor, equipped with pipe boom, owned by the Little Pipe Line Construction Co., working at Beecher City, Ill.

WHEN International Harvester engineers started laying out International TracTracTors, they designed for power . . . and for accessibility of all working parts to keep maintenance costs at the minimum. Every owner and operator knows the results—TracTracTors are the most accessible, most easily serviced crawler tractors on the market. All parts, and the steering clutches and brakes are so easy to get at that maintenance is surprisingly low. Steering clutches and brakes in TracTracTors can be inspected, adjusted, or replaced through rear cover plates without disturbing the track, track frame, or driving sprocket.

Special dust seals protect the bearings of the drive gear and pinion shaft, the track rollers, and idler bearings. Oil and lubricants are sealed in. Dirt, grit, water, etc., are sealed out.

International TracTracTors save money in crawler-tractor operation. Cost sheets of owners prove it again and again. Find out for yourself what these units can do for you. Ask the nearby International industrial power dealer or Company-owned branch for a demonstration. There are five different models (gasoline and Diesel). The International Industrial Power line also includes five wheel-type tractors (gasoline and Diesel); and 11 Power Units ranging up to 110 max. h.p. (gasoline, gas, and Diesel).

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INTERNATIONAL Industrial Power

be less than the breathing due to pumping. In this case the required pressure capacity should be taken at least as twice the breathing due to pumping in.

The hourly rates of temperature rise and temperature drop in the vapor space of an almost empty tank are among the four factors necessary for breather-requirement calculations. The actual values to be assigned to them in any particular case are at times uncertain, because the available data refer usually to tanks full or almost full. These rates are often selected according to main geographic sub-divisions as, for instance, Pacific Coast, Atlantic Coast, Mid-Continent, and Gulf Coast—all of which are too general. A cooperative effort seems, therefore, to be desirable in order to pool all available data on the subject, and in order to gather new data, so that in time a map could be compiled showing the maximum recorded rates of temperature rise and temperature drop in the areas of interest.

In general, the rate of temperature drop, due to a sudden shower on a hot summer day, should be chosen 10 degrees or 15 degrees higher than the rate of temperature rise.

Selection of Venting Equipment

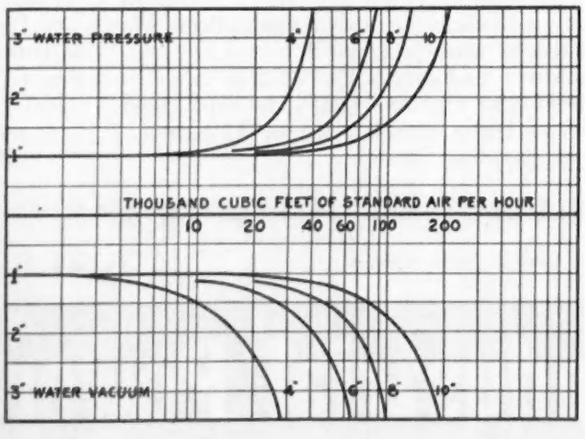
Breathing-capacity requirements determined from the chart correspond to the two most severe combinations of adverse conditions, and the probability that these may ever be realized is remote. However, it seems proper that the venting equipment be chosen so that sufficient pressure and vacuum capacities are available at tank pressure and tank vacuum to eliminate definitely any possibility of damage to the tank.

On the pressure side, it is important to avoid the lifting of the roof plates from the rafters on account of excessive pressure, as this may lead to the development of leaks in the seams and joints and to an unnecessary increase of evaporation losses. The 3/16-inch roof plates used in standard tank construction weigh approximately 0.85 ounce per square inch, which is equivalent to 1.5 inches of water. If the venting equipment is selected according to the capacity available at 1.5 inches of water, there will be an ample margin of safety to protect against rupture of the roof. On the vacuum side, we must allow a sufficient margin of safety to protect the tank from collapsing under excessive vacuum.

As far as the roof is concerned, the design live load for tanks of API standard construction is 25 pounds per square feet, which corresponds to 4.8 inches of water. Beyond this load there is a margin of safety, indicating adequate strength in the roof itself. Rather uncertain, however, is the determination of the resistance to collapse of the shell under vacuum. The application, to the top course of large tank shells, of the empirical formulas giving the collapsing pressure for thin cylinders under external pressure, gives values of the order of 1 inch to 2 inches of water. While it is doubtful whether these formulas can be applied to tank shells, there can be no doubt that collapse is retarded by the stiffening action of the top angle, and of the roof itself. In Table 1 is shown that two of the companies listed ("B" and "D") choose the vacuum-capacity rating, respectively, at 3 inches and not beyond 4 inches of water vacuum. These values may be considered by some as being too high, but must be taken into consideration as an indication of actual practice. Considering all factors then, it seems to be safe to recommend that the available vacuum capacity be chosen at 1.75 inches of water vacuum.

The above refers to the general case of standard tanks wherein the setting of the relief valves is 1 inch of water pressure or vacuum. There are, however, cases in which the construction of the tank permits the adoption of higher pressure and vacuum settings. The choice of the available capacities can then be made at points of the capacity curves corresponding to values of pressure or vacuum selected with considerations similar to the above; but if there is any uncertainty, it is safe to recommend that the choice be made at values of pressure and vacuum equal to 1½ times the pressures or vacuum settings.

FIGURE 1
Typical Capacity Curves of Pressure and Vacuum Breathers.



Examples of Applications of the Proposed Standard Method

At the bottom of Table 1 are shown some numerical applications of the proposed standard method: one set for low values of Reid vapor pressure and low rates of temperature changes; and one set for high Reid vapor pressure and high rates of temperature changes. The number and sizes of breathers have been chosen by means of the typical capacity curves in Figure 1 for a pressure and vacuum setting of 1 inch of water.

It can be seen from these examples that at times either the pressure condition or the vacuum condition may be the determining factor in the choice, or both conditions may apply equally.

It is considered good general practice to install a number of smaller breathers rather than one large one, and such practice should be particularly recommended in a tentative standard.

Breather Flame-Arrester Units

A breather flame-arrester unit has a greatly reduced capacity compared to the breather alone. If a reliable capacity curve for the combined unit is not available, it can be derived from the curves of each component taking into consideration the sum of the pressure drops through the two fittings corresponding to the same capacities. Flame arresters are subject to some clogging; and, while for tanks in sales service handling clean products no sensible reduction in capacity may be expected, in other cases a 20-percent reduction at least should be made in the capacity of the combination unit.

Vapor Efflux Due to Boiling

If at some probable temperature of the liquid surface the vapor pressure of the liquid stored equals

GUIDE POSTS TO BETTER DIESEL PERFORMANCE

DIESEL ENGINE PARTS

PART	KEY LETTER
Base	A,B,L,X
Bed Plate - heavy engine	L,N
Bed Plate - light engine	A,B,X
Cams	H,J,Q
Cams - heavy engine	G
Camshafts - heat treated	Q,S
Connecting Rod Shoes, Guides	C
Cooling Water Circulating Pump Body	A,R,T
Cooling Water Circulating Pump Impeller	A,R,T
Crankcase	A,B,C,L,X
Crankshaft	S
Cylinder Blocks, Bodies, Frames - heavy engine	C,D,L
Cylinder Liners, for use with above	B,C,M
Cylinder Blocks, Bodies, Frames - light engine	A,E,K
Cylinder Liners, for use with above	A,E,K,R
Cylinder Blocks, Bodies, Frames - high strength	B,R
Cylinder Heads - heavy engine - high strength	M
Cylinder Heads - medium engine	L,P
Cylinder Heads - light engine	A,E,F
Cylinder Heads - light engine - high strength	N
Cylinder Liners - light and medium engines (sand cast, heat treatment optional)	E,P
Cylinder Liners - centrifugally cast, heat treated	A,E,P,R
Cylinder Liners - For use with aluminum blocks and pistons	T
Flywheel	A,B,X
Frame castings - heavy engine	A,B,P,X
Fuel Oil Pump Body	A,R
Housings - heavy engine - see also Frame castings	A,B,P,X
Lubricating Pump Body	A,R
Manifolds	E,P,F,G
Manifolds - water cooled	E,T
Oil Cooler Body	E,T
Pistons - heavy engine	C,M,P
Pistons - heavy and medium engines - high strength	B,N,P
Pistons - light engine	E,K
Piston Crowns - inserts in aluminum pistons - light engine	T
Piston Rings - heavy engine - single cast	A,L,K
Piston Rings - heavy engine - pot cast	B,D,E
Piston Rings - heat treated	R,S
Piston Rings - medium engine - pot cast	A,K
Piston Rings - light engine - pot cast	K,R
Timing Gears	A,K,R
Turbo-Blower Casing	A,K,R
Valves - Cooled cast on head	E,G,T
Valve Guides	E,T
Valve Seats - for use with aluminum heads	T
Valve Seats - heavy engine	E,L

RECOMMENDED COMPOSITIONS AND TYPICAL MECHANICAL PROPERTIES OF NICKEL CAST IRONS FOR DIESEL ENGINE PARTS

KEY LETTER	CHEMICAL COMPOSITION						TYPICAL RANGE OF MECHANICAL PROPERTIES	
	TOTAL CARBON	SILICON	MANGANESE	NICKEL	CHROMIUM	MOLYBDENUM	TENSILE STRENGTH, p.s.i.	BRINELL HARDNESS
A	3.10/3.30	1.40/1.80	0.50/0.80	1.25/1.75	-	-	35,000/40,000	200/240 (7)
B	2.75/3.00	1.30/1.70	0.60/0.90	1.50/2.00	-	-	50,000/60,000	220/260
C	3.00/3.20	1.00/1.40	0.50/0.80	1.00/1.50	-	-	36,000/40,000	200/260
D	3.00/3.20	0.90/1.30	0.50/0.80	1.75/2.25	-	-	38,000/44,000	200/260
E	3.10/3.30	1.70/2.10	0.50/0.80	1.50/2.00	0.40/0.60	-	36,000/40,000	210/250 (7)
F	3.20/3.40	1.90/2.30	0.50/0.80	1.00/1.50	0.40/0.60	-	33,000/38,000	200/240
G	3.10/3.50	1.50/1.80	0.50/0.80	1.75/2.25	0.60/0.75	-	36,000/42,000	220/280
H	3.00/3.20	1.00/1.40	0.60/0.90	2.75/3.25	0.40/0.60	-	45,000/55,000	260/320 (7)
J	3.00/3.20	0.70/0.90	0.60/0.90	1.75/2.25	0.90/1.10	-	35,000/40,000	280/350 (6)
K	3.00/3.30	1.70/2.20	0.50/0.80	0.75/1.25	0.15/0.30	-	33,000/38,000	170/220
L	3.05/3.30	1.00/1.40	0.50/0.80	1.00/1.75	0.30/0.60	(5)	36,000/42,000	220/260
M	2.90/3.10	1.00/1.90	0.60/0.90	1.00/1.50	0.25/0.35	(5)	40,000/50,000	210/260
N	2.70/3.00	1.50/1.90	0.60/0.90	1.75/2.25	0.20/0.40	(5)	50,000/60,000	220/260
P	3.00/3.25	1.30/1.75	0.60/0.90	1.35/1.50	0.30/0.50	0.30/0.60	40,000/50,000	200/260 (7)
Q (3)	3.10/3.40	2.10/2.40	0.50/0.75	0.20/0.40	0.75/1.00	0.40/0.60	50,000/55,000	260/300 (7)
R	3.10/3.30	2.00/2.40	0.50/0.80	1.25/1.75	0.10/0.30	0.30/0.50	45,000/55,000	220/280
S	2.60/3.10	1.90/2.50	0.65/1.00	1.25/1.75	-	0.60/1.00	60,000/70,000	260/300 (7)
T	2.30/3.00	1.00/2.00	1.00/1.50	13.00/16.00 (4)	2.00/5.00	-	22,000/30,000	140/180
X	3.00/3.50	1.00/2.20	0.50/0.80	-	-	-	20,000/30,000	140/180

FOOT-NOTES: (3) Made by Campbell, Wyant and Cannon Foundry Co. (4) Also includes 5.00/7.00% copper. (5) Optional. (6) The chilled surface hardness will be approximately 550 Brinell. (7) Heat treatment optional.

WITH economical Diesel power being applied to many new uses, this summary of Diesel engine materials in actual service can be helpful as a guide and comparison for your specifications. These Nickel cast irons have a background of successful performance under many conditions.

Because Diesel engines vary widely in size and type, more than one Nickel cast iron composition is suggested and your choice will depend upon the size and service requirements of your engine.

Since earliest days of Diesel development, it has been Nickel's privilege to aid in the development of stronger, longer-wearing materials which withstand higher pressures and higher temperatures. Consultation regarding the uses of Nickel is invited.

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atmospheric pressure, evaporation is greatly accelerated by boiling. Vapor efflux will be greatest when the tank is almost full and the rate of evaporation can be calculated, taking into consideration the heat input (solar radiation and convection) and the latent heat of vaporization of the product stored. The number and size of breathers then can be determined according to the required capacity so calculated, plus pumping displacement. A density coefficient will have to be introduced for the usual reduction to standard air.

Emergency Venting

The NFPA "Suggested Ordinance for the Handling of Flammable Liquids" states that, for vertical tanks with cone roofs having a slope of less than 2½ inches per foot, no emergency vents are required. On horizontal tanks and on vertical tanks with cone roofs having greater than a 2½-inch pitch, the schedule proposed in the NFPA ordinance can be used for guidance.

Conclusion

The tentative standard method which has been outlined has been based on broad assumptions, the details of which are more fully shown in the appendix of this paper. More than following a strictly thermodynamic treatment, we have endeavored to work out a method which, while simple in its application, is at the same time flexible enough to make it acceptable generally. Moreover, it has been worked out in such a manner that its application to specific cases is in reasonable agreement with available experimental data and with current practice.

It is evident, however, that in order to make such a method workable fully, it must be integrated with reasonably accurate data regarding rates of temperature rise and fall for various areas.

In respect to the actual breathers themselves, everyone is familiar with the capacity curves furnished by the manufacturers. In the main they have been found to be reliable; but the question may be raised in some minds whether they can be trusted implicitly, and if the data so furnished are directly comparable.

A first source of confusion arises from the use of two different pressure units: ounces per square inch, and inches of water. In dealing with low-pressure tanks, agreement on the exclusive use of the "inch of water" as a standard pressure unit would be most desirable.

Another source of confusion is due to the fact that capacity curves as furnished by the manufacturers do not always correspond to the same pressure setting and, consequently, capacity curves of the same size breathers are not always directly comparable. A third source of doubt lies in the lack of knowledge of how these capacity curves have been obtained. In this connection, the suggestion is offered that the capacities of pressure and vacuum breathers and other similar tank equipment be determined according to some well-established test procedure—either by the manufacturers themselves, or by some neutral body. One of the specifications of the test procedure should be a standard pressure and vacuum setting (1 inch of water, for instance); it would then be desirable to carry out a sufficient number of tests to determine what variation in the capacity curves is brought about by a change in the valve settings.

The conclusions of this study may be summed up in the following proposals:

a. Adoption of the proposed standard method as a "tentative standard" to be modified or integrated by the results of a certain period of actual application.

b. Establishment of a clearing house for the collection and correlation of experimental data relative to tank venting, with particular reference to maximum recorded rates of temperature variations.

c. Agreement on the use of the "inch of water" as a standard pressure unit for low-pressure storage tanks.

d. Establishment of a well-defined test procedure for the determination of the flow characteristics of breathers and similar venting equipment.

APPENDIX

Tank breathing is due to variations of the thermal conditions inside the tank, or to volumetric displacement due to the operations of filling and emptying. In the first case we have either pressure or vacuum thermal breathing (corresponding to a rise or to a drop in temperature); in the second case we have pumping-in or pumping-out breathing.

Thermal Breathing

If the vapor space contained an homogeneous perfect gas, the changes in volume due to temperature variations could be determined quickly by the application of the perfect-gas law. However, the vapor space contains a mixture of air (an almost perfect gas) and gasoline vapors; and to the latter the perfect-gas law does not apply, because they are in a condition of equilibrium with the liquid. A unit volume of air and vapor mixture in the tank vapor space may be considered as containing two equal unit volumes of air and vapors, each at a certain partial pressure. The sum of these partial pressures is the total pressure of the mixture (Dalton's law). The total pressure, which is the pressure existing in the tank vapor space, varies between the narrow limits defined by the settings of the pressure- and vacuum-relief valve, and in low-pressure tanks can be considered constant and equal to 14.7 pounds per square inch. The partial pressure p of the vapors is a function of the temperature of the liquid surface, and is independent of the total pressure of the mixture. Consequently, for a certain value of this temperature the partial pressure of the air is the difference, or $14.7 - p$.

When the temperature of the vapor space and the temperature of the liquid surface change on account of changing atmospheric conditions, there is a change in both the temperature and the pressure conditions of the air contained in the vapor space.

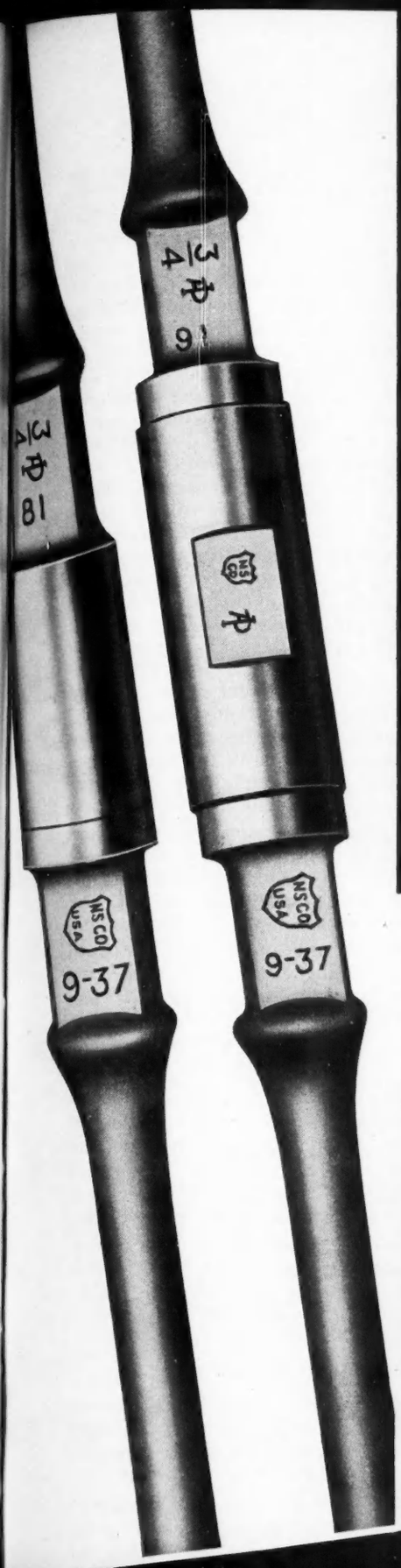
Pressure Thermal Breathing

The volume of discharge can be determined with sufficient accuracy by the application of the perfect-gas law to the air only. In the case of a temperature rise a volume V of air, that initially has a temperature T_1 (absolute) and a partial pressure $14.7—P_1$, undergoes a volumetric variation according to the equation:

$$V'—V = \left[\left(\frac{T_2}{T_1}\right)\left(\frac{14.7 — P_1}{14.7 — p_2}\right) — 1\right] V \qquad (1)$$

where T_2 is the final temperature of the vapor space, and p_2 is the final partial pressure of the vapors. As a reasonable approximation, equation (1) may be said to represent the volume to be discharged through the pressure-relief valve for a volume V of the vapor space.

The air and vapors contained in the volume of discharge are directly proportional to the respective partial



It's ultimate cost rather than initial cost that determines Sucker Rod values.

When Sucker Rods are selected as a result of a comprehensive survey of individual pumping conditions by National's Engineering Staff, the resultant service achieves exceedingly low ultimate cost.

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pressures. It is then possible to determine the density of the mixture discharged, which must be expressed in volume of standard air in order to permit a comparison with the rated capacities of pressure and vacuum breathers. Some assumption would have to be made regarding the composition of the vapors contained in the vapor space. We shall assume that the average tank vapors contain butane, pentane, and hexane vapors in the following proportions:

	(Percent)	Density (Air = 1)
Butane	50	2
Pentane	35	2.48
Hexane	15	2.97

This assumption is based on the average composition of tank vapors in several Pacific Coast installations. Analyses of the air-vapor mixture in tanks containing crude oil in the Mid-Continent area show large percentages of ethane and propane. These vapors have lower densities than those considered in the above assumption and would, consequently, lead to a lower value of the density of the air-vapor mixture. The assumption made is probably conservative in the majority of cases, and variations from the above percentages would not affect greatly the final results.

The density of an air and vapor mixture where p is the partial pressure of the vapors would then be:

$$d = \frac{p}{14.7}\Big[(0.5)\,(2) + 0.35\,(2.48) + 0.15\,(2.97)\Big] + \frac{14.7 - p}{14.7} \quad (1)$$

$$= 2.318\,\frac{p}{14.7} + \frac{14.7 - p}{14.7} = 0.09p \quad (2)$$

The flow capacity of vents for gases other than air is inversely proportional to the square root of the density; consequently, the discharge expressed in volume of standard air will be:

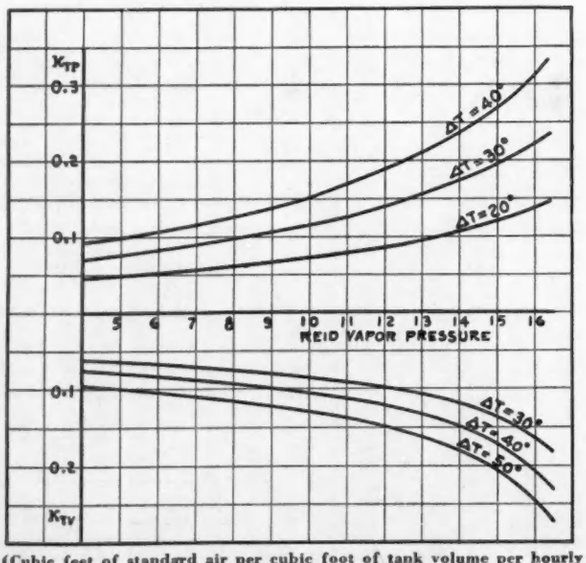
$$\sqrt{d}(V' - V) = \sqrt{d}\left[\left(\frac{T_2}{T_1}\right)\left(\frac{14.7 - p_1}{14.7 - p_2}\right) - 1\right]V = K_{TP}V \quad (3)$$

cubic feet of standard air.

K_{TP} can be termed a "coefficient of thermal pressure discharge," while $\sqrt{d}$ can be termed a "density coefficient."

FIGURE 2

Coefficients K_{TP} of Thermal Pressure Discharge and K_{TV} of Thermal Vacuum Intake.



(Cubic feet of standard air per cubic foot of tank volume per hourly variations of the vapor-space temperature.)

In Figure 2 are shown three curves of the coefficients of thermal pressure discharge plotted against values of Reid vapor pressure. Each curve refers to 20, 30, and 40 degrees, respectively, of vapor-space hourly temperature rise.

In order to arrive at the actual numerical values of the coefficient, the values of vapor pressures (derived for each Reid vapor pressure from a Cox vapor-pressure chart) have been plotted, for more accurate reading, on plain cross-section paper against temperature. The assumption was made that, in the initial condition, the vapor space was saturated fully, with a partial pressure of the vapors equal to the liquid vapor pressure at a surface temperature of 75° F. It was then assumed that for each 10 degrees of vapor-space temperature rise, the actual partial pressure of the vapors existing in the vapor space was that corresponding to 0.75-degree rise of the liquid surface temperature. The final vapor pressures were, consequently, read off the vapor-pressure-temperature chart at 76.5 degrees, 77.25 degrees, and 78 degrees, respectively. It was assumed further that to this final vapor pressure corresponded a condition of full saturation of the vapor space. It is probable that the rise of the liquid surface temperature is larger than the above, but certainly there would be a lag in the full saturation of the vapor space, so that the final partial vapor pressure in the vapor space would be less than that corresponding to the actual value of the liquid surface temperature.

The choice of the initial vapor surface temperature (75° F.) is purely arbitrary; but, for an almost empty tank, is representative of average temperature conditions in the early hours of the hottest summer day. The final vapor pressures were chosen so that the formula would fit the results of some tests which recorded the daily volume of breathing from tanks located on the Pacific Coast—which tanks contained both low- and high-pressure products, and some of which tanks were almost empty and some almost full. The corresponding temperature records were also available. The same *daily* temperature ranges were introduced in the formula as *hourly rates* of temperature change, and the final vapor pressures were chosen in such a way as to obtain calculated breathing volumes in line with the recorded daily volumes of breathing. The fact, however, was taken into account that the volume of breathing during a 24-hour period is larger than that over a 1-hour period if the temperature ranges are the same; this is due to the fact that, over a longer period of time, the degree of saturation of the vapor space will be greater.

Thermal Vacuum Breathing

A thermal vacuum condition is created in a tank when there is a decrease in the temperature of the vapor space, and eventually also a decrease in the temperature of the oil surface.

The most severe case is that represented by a temperature drop caused by a thunder shower on a hot summer day. With the creation of vacuum inside the tank, the incoming air will tend to spread like a blanket on the upper part of the vapor space, and its saturation with vapors will take place later. Evidence to this effect is shown in the pressure curves of tanks that have been subjected to a sudden shower on a hot summer day. These curves show a rapid drop from pressure to vacuum followed by a rise from vacuum to pressure—which would indicate precisely the phenomenon outlined above. With sufficient approximation,

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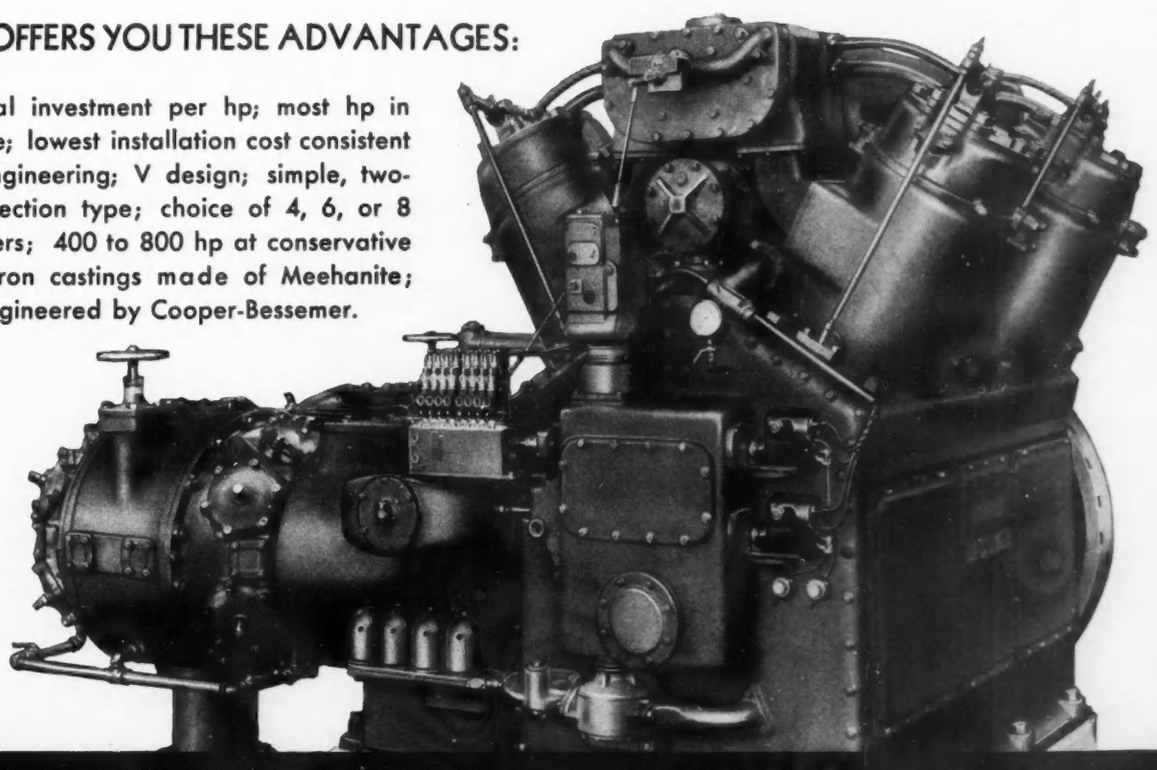

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we can then say that the volume of air to be admitted into the tank for a volume V of the vapor space is:

$$V - V' = \left[1 - \left(\frac{14.7 - p_1}{14.7 - p_2}\right)\left(\frac{T_2}{T_1}\right)\right]V = K_{TV}V \quad (4)$$

cubic feet for each cubic foot of vapor space, *where* T_1 and T_2 are the initial and final temperatures (absolute) of the vapor space, and p_1 and p_2 are the initial and final partial pressures of the vapors. Equation (4), like equation (1), is derived from the application of the perfect-gas law to the air contained in the vapor space. No correction for reduction to volume of standard air is deemed worthwhile, and K_{TV} can be termed a "coefficient of thermal vacuum intake."

In Figure 2 are shown three curves of the coefficients K_{TV} plotted against values of the Reid vapor pressure. Each curve refers to 30, 40, and 50 degrees, respectively, of hourly vapor-space temperature drop.

As for the values of the partial pressures of the vapors, the fact has to be taken into account that, in the initial condition, the vapor space cannot in this case be considered as being saturated fully. Consequently, in assuming that the initial vapor pressure was that corresponding to a surface temperature of 85° F., the final vapor pressures were taken at surface temperatures of 83.5, 83, and 82.5 degrees, respectively; i.e., there was allowed a drop in surface temperature of ½ degree for each 10-degree drop in vapor-space temperature, instead of ¾ degree as assumed in the case of the thermal pressure discharge.

Pumping-in Breathing

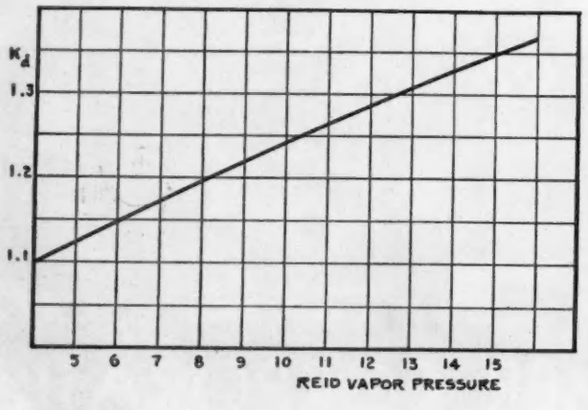
Numerous tests have shown that the out-breathing during pumping-in operations has a volume greater than the effected displacement. In some tests it was calculated that the volume breathed was 1.4 times the displacement, exclusive of temperature breathing. In other tests the volume breathed varied from 1.14 to 2.49 times the displacement, with an average of 1.66—although this breathing could have included normal thermal breathing.

The explanation is that, when oil is pumped into a tank in which the vapor space is not saturated fully, the agitation of the liquid will promote further evaporation—increasing, therefore, the partial pressure of the oil vapors and, consequently, forcing an additional volume of air and vapor mixture through the vent in excess of the volume equivalent to the pumping displacement.

For the purpose of required breather-capacity calculations, the most severe case is the combination of pumping-in operation at the maximum rate together with the thermal pressure breathing that we have already analyzed. For this thermal pressure breathing we have considered the case of the almost empty tank with a vapor space saturated fully at the temperature of the oil surface. It is permissible, therefore, to introduce in our calculation the volumetric displacement due to pumping in with but one mutiplier; i.e., the density coefficient K_d, in order to reduce "volume of air and vapor mixture displaced" to "volume of standard air."

The values of this density coefficient K_d are given in Figure 3. They were calculated for vapor pressures at average vapor-space temperature conditions.

FIGURE 3
Density Coefficients K_d.



Total Required Capacity

The total breathing capacities required, respectively, on the pressure and on the vacuum side can then be calculated with the formulas:

$$C_p = K_{TP}V + K_dD_i \quad (5)$$

$$C_v = K_{TV}V + D_o \quad (6)$$

Where: V is the volume of the tank in cubic feet; D_i and D_o the pumping-in and the pumping-out rates in cubic feet per hour; and the other symbols have meanings already explained.

To facilitate the numerical computations, a nomographic chart has been prepared that in a few and simple steps gives the values of the required breather capacities. This chart is based on equations (5) and (6) re-written as follows:

$$C_p = K'_{TP}V + K'_dD_i$$
$$C_v = K'_{TV}V + 5.6D_o$$

Where: V, D_i, and D_o are expressed in barrels instead of cubic feet. Full instructions how to use the chart are contained both in the chart itself and in the text.

Acknowledgment

The present study was made possible through the active cooperation of the late W. M. Giffen and of C. C. Ashley, chairman of the Institute's Committee on the Standardization of Steel Tanks for Oil Storage. Basic data were furnished by the following companies: The Atlantic Refining Company, Chicago Bridge and Iron Company, Continental Oil Company, Gulf Oil Corporation, The Pure Oil Company, Shell Oil Company, Sinclair Oil Company, Standard Oil Company of California, Standard Oil Development Company, The Texas Company, Tide Water-Associated Oil Company, and the White Eagle Oil Company.

The writer particularly is indebted for assistance and helpful criticism to the following gentlemen: H. J. Wilson, Tide Water-Associated Oil Company; A. J. Alstrom, Standard Oil Company of California; and C. J. Nobmann, Shell Oil Company.

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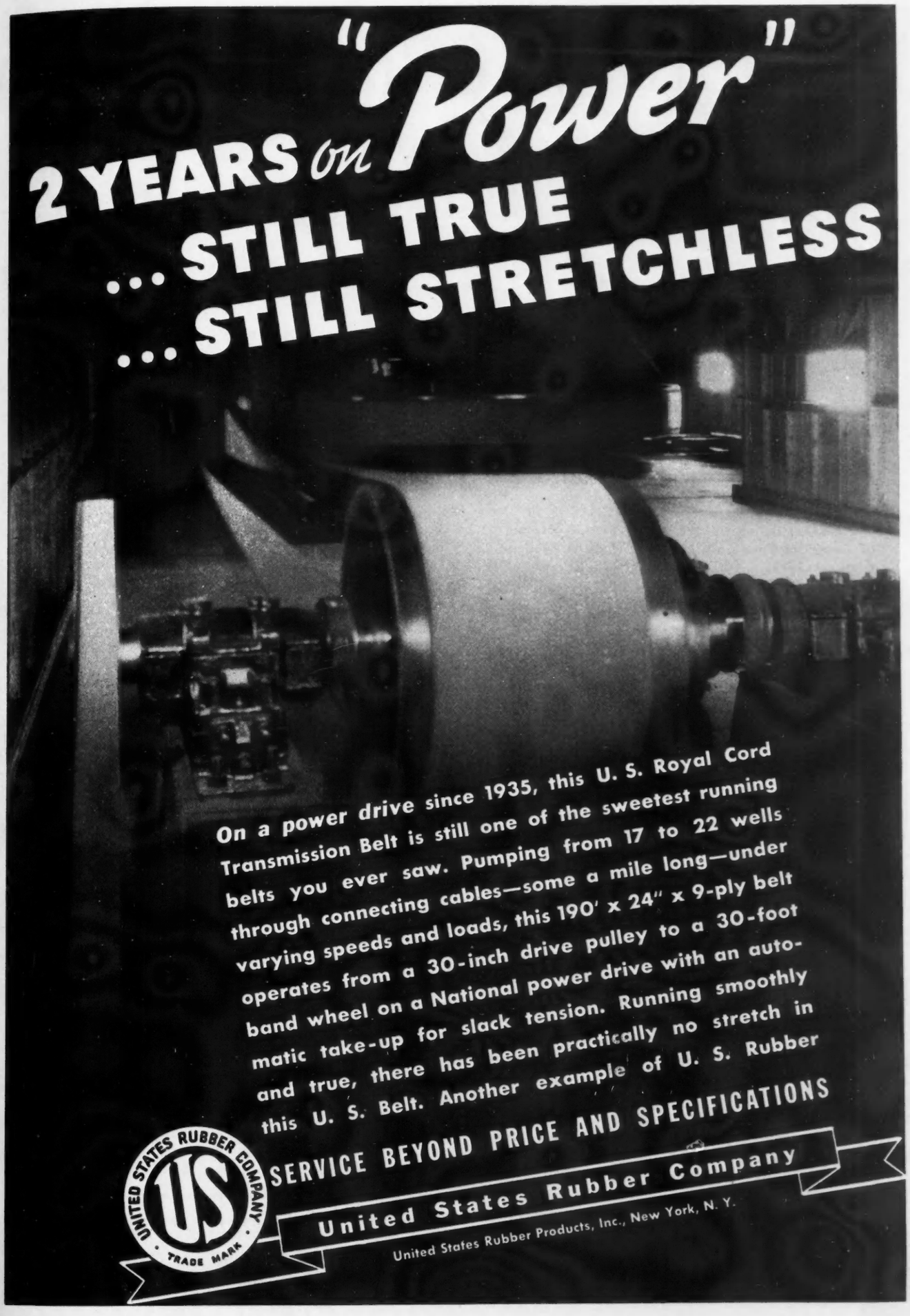

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Solubility Relations and Volumetric Behavior

OF THREE GRAVITIES OF CRUDE AND ASSOCIATED GASES

By J. E. GOSLINE and C. R. DODSON
Standard Oil Company of California

Presented before the Nineteenth Annual Meeting of American Petroleum Institute, Division of Production, Chicago, November 18, 1938.

A KNOWLEDGE of the physical properties of reservoir fluids is fundamental to a rational treatment of many problems in production engineering. Unfortunately, the behavior of naturally-occurring hydrocarbon systems is extremely complex and, up to the present time, not generally predictable from a knowledge of the composition of the system. Some companies, therefore, have determined experimentally the necessary constants for representative samples of the fluids under question. Such determinations usually are restricted in application to conditions simulating closely those under which the samples were procured, inasmuch as relatively small variations in composition of material exert an appreciable influence upon certain of the characteristics of the system. In some cases such as, for example, a one-zone reservoir containing under-saturated crude of uniform gravity, a single set of determinations upon representative samples will be applicable to the whole field. Usually, however, where variations in formation gas/oil ratio and gravity occur, determinations upon a series of samples are necessary. Ordinarily, if properly sampled, the results of such determinations reasonably are correlative with gravity of residual crude—thus permitting a close approximation of factors for intermediate conditions.

In this paper are presented the results obtained from three mixtures from flowing wells producing from a sand of upper Miocene age in the San Joaquin Valley, California. Of the many possible correlations on an oil-gravity basis, only a sufficient number are presented to indicate the trend of certain of the most commonly-used factors. The absolute values must be used with caution for other crudes and gases of the same gravity; because, as has been mentioned previously, total composition has a material influence upon the behaviour of the material. The nature of the dependency of certain of the factors upon gravity is believed, however, to be of interest, and perhaps of some quantitative utility to those desiring to estimate factors for conditions in a particular field on a basis of a restricted number of actual determinations.

Sampling and Experimental Procedure

Saturated liquids and excess gas were obtained, in special calibrated cylinders, directly from the high-pressure separators at the well. In each case the separator was operating at a pressure between 400 and 500 pounds.

The variable-volume cell utilized in making the determinations is the same type as developed by

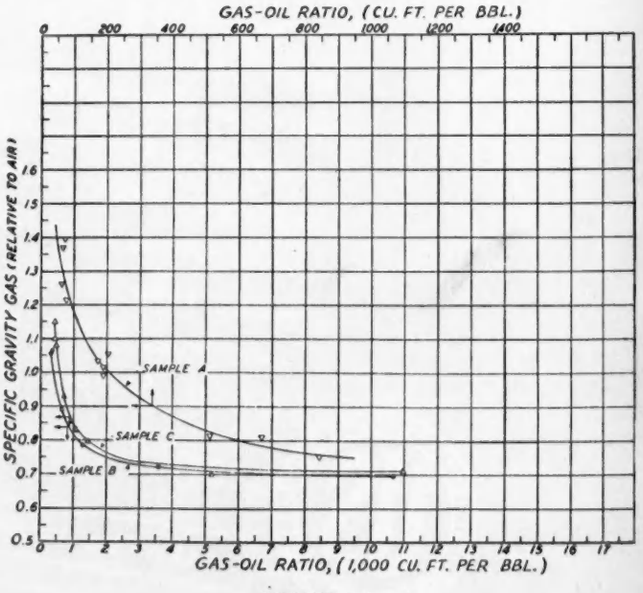

FIGURE 1
Relationship between Gas/Oil Ratio and Specific Gravity of Gas.

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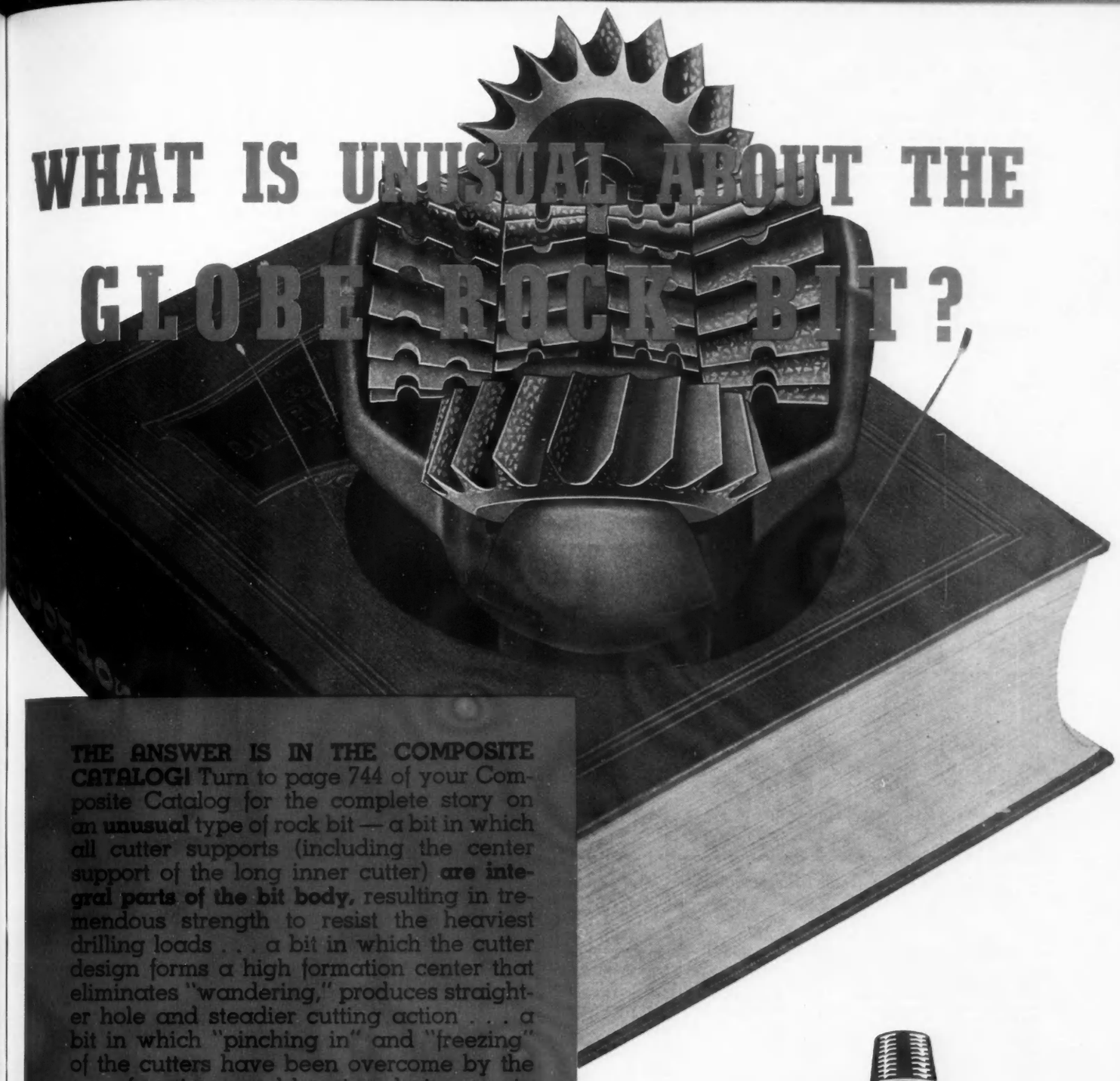

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UNDERREAMERS

Lacey[1a] and associates in connection with API Research Project 37.

Saturated liquid was transferred directly to the cell for the lowest gas/oil ratio measurements. Higher ratios were obtained by introducing varying quantities of excess gas. Gas/oil ratios were calculated from direct measurement of gas and residual-oil volumes at the end of a run. The gas was metered off the cell in the same pressure and temperature stages as utilized in the field separation.

TABLE 1

Values of Formation-Volume Factor

SAMPLE "A"

Temperature, (° F.)	*Pressure (Lb. Sq. In.)	Gas/Oil Ratio (Cu. Ft. per Bbl.)			
		173.5†	511.5	667	835.5
100	200	1.93	....	....	....
100	400	1.15	3.09	....	....
100	600	1.14	2.33	2.98	3.67
100	800	1.14	1.85	2.32	2.87
100	1,000	1.13	1.60	1.95	2.35
100	1,200	1.13	1.43	1.72	2.04
100	1,400	1.13	1.33	1.57	1.84
100	1,600	1.13	1.27	1.47	1.70
100	1,800	1.12	1.27	1.40	1.60
100	2,000	1.12	1.27	1.35	1.52
100	2,200	1.12	1.27	1.34	1.46
100	2,400	1.12	1.26	1.34	1.42
100	2,600	1.12	1.26	1.34	1.40
100	2,800	1.12	1.26	1.33	1.40
100	3,000	1.12	1.26	1.33	1.40

SAMPLE "A"

Temperature (° F.)	*Pressure (Lb. Sq. In.)	Gas/Oil Ratio (Cu. Ft. per Bbl.)			
		175.3†	511.5	667	835.5
198	400	1.67	....	....	....
198	600	1.24	2.93	3.41	....
198	800	1.22	2.38	2.91	3.31
198	1,000	1.22	1.99	2.47	2.94
198	1,200	1.21	1.76	2.15	2.60
198	1,400	1.21	1.60	1.93	2.31
198	1,600	1.20	1.48	1.77	2.09
198	1,800	1.20	1.40	1.66	1.94
198	2,000	1.20	1.35	1.57	1.82
198	2,200	1.20	1.35	1.50	1.72
198	2,400	1.19	1.34	1.45	1.65
198	2,600	1.19	1.34	1.43	1.59
198	2,800	1.19	1.34	1.42	1.55
198	3,000	1.18	1.33	1.42	1.51

* All values of pressure are absolute.
† The data for gas/oil ratio=175.3 is at 225.5° F.

SAMPLE "B"

Temperature (° F.)	*Pressure (Lb. Sq. In.)	Gas/Oil Ratio (Cu. Ft. per Bbl.)			
		659	1,313	3,570	10,690
100	600	2.58	....	....	....
100	800	1.99	....	10.82	....
100	1,000	1.66	3.21	8.63	....
100	1,200	1.46	2.71	7.07	....
100	1,400	1.33	2.38	5.98	17.33
100	1,600	1.33	2.13	5.20	14.89
100	1,800	1.33	1.96	4.62	13.00
100	2,000	1.32	1.84	4.19	11.59
100	2,200	1.32	1.74	3.84	10.53
100	2,400	1.32	1.67	3.58	9.66
100	2,600	1.31	1.64	3.38	9.02
100	2,800	1.31	1.63	3.22	8.62
100	3,000	1.31	1.63	3.10	8.26
100	3,200	1.30	1.62	3.02	8.00

SAMPLE "B"

Temperature (° F.)	*Pressure (Lb. Sq. In.)	Gas/Oil Ratio (Cu. Ft. per Bbl.)			
		659	1,313	3,570	10,690
149	600	3.04	....	....	....
149	800	2.32	....	....	....
149	1,000	1.92	3.71	10.00	....
149	1,200	1.68	3.15	8.25	....
149	1,400	1.51	2.74	7.02	....
149	1,600	1.40	2.44	6.10	17.62
149	1,800	1.40	2.23	5.42	15.47
149	2,000	1.39	2.08	4.90	13.84
149	2,200	1.39	1.96	4.49	12.54
149	2,400	1.38	1.86	4.16	11.50
149	2,600	1.38	1.79	3.90	10.67
149	2,800	1.38	1.74	3.70	10.04
149	3,000	1.37	1.72	3.54	9.55
149	3,200	1.37	1.71	3.42	9.17

Experimental Results

The three crudes investigated had gravities of 35.8, 48.2, and 63.4 deg. API, and will be referred to in the following discussion as samples "A," "B," and "C," respectively. Inasmuch as for each sample varying amounts of a constant-composition gas were added to saturated trap liquid to alter the gas/oil ratio, the composition of the total gas released from solution at a given pressure and temperature is a function of gas/oil ratio. This relationship is indicated in Figure 1. In this connection, it should be mentioned that, in the authors' opinion, determinations made upon a

SAMPLE "B"

Temperature (° F.)	*Pressure (Lb. Sq. In.)	Gas/Oil Ratio (Cu. Ft. per Bbl.)			
		659	1,313	3,570	10,690
191	600	3.66	....	....	....
191	800	2.61	....	....	....
191	1,000	2.15	....	....	....
191	1,200	1.85	3.56	9.26	....
191	1,400	1.66	3.11	7.87	....
191	1,600	1.52	2.78	6.86	....
191	1,800	1.43	2.51	6.11	17.50
191	2,000	1.43	2.32	5.51	15.66
191	2,200	1.42	2.16	5.04	14.24
191	2,400	1.42	2.03	4.66	13.04
191	2,600	1.41	1.93	4.37	12.09
191	2,800	1.41	1.86	4.15	11.31
191	3,000	1.40	....	3.97	10.69
191	3,200	1.40	....	3.83	10.21

SAMPLE "C"

Temp. (° F.)	*Pressure (Lb. Sq. In.)	Gas/Oil Ratio (Cu. Ft. per Bbl.)					
		421	739	1,042	1,425	5,280	10,980
100	400	1.59	....	....	....	....	....
100	600	1.29	2.66	4.02	5.53	....	....
100	800	1.28	1.99	2.97	4.32	16.15	30.50
100	1,000	1.28	1.61	2.38	3.36	12.12	24.80
100	1,200	1.27	1.47	1.99	2.81	10.00	20.90
100	1,400	1.27	1.47	1.72	2.40	8.40	17.82
100	1,600	1.26	1.46	1.61	2.12	7.21	15.22
100	1,800	1.26	1.46	1.60	1.92	6.35	13.21
100	2,000	1.26	1.45	1.59	1.81	5.66	11.72
100	2,200	1.25	1.45	1.59	1.80	5.17	10.64
100	2,400	1.25	1.44	1.58	1.79	4.76	9.74
100	2,600	1.25	1.44	1.57	1.78	4.43	9.02
100	2,800	1.25	1.44	1.57	1.78	4.23	8.48
100	3,000	1.24	1.43	1.56	1.77	4.13	8.13
100	3,200	1.24	1.43	1.56	1.76	4.07	7.90
100	3,400	1.24	1.43	1.55	1.75	4.01	7.72

* All values of pressure are absolute.

SAMPLE "C"

Temp. (° F.)	*Pressure (Lb. Sq. In.)	Gas/Oil Ratio (Cu. Ft. per Bbl.)					
		421	739	1,042	1,425	5,280	10,980
140	400	1.91	4.46	5.96	....	....	....
140	600	1.33	2.95	4.40	6.01	....	....
140	800	1.32	2.19	3.35	4.76	17.85	....
140	1,000	1.32	1.76	2.68	3.81	14.10	28.15
140	1,200	1.31	1.51	2.23	3.18	11.40	23.62
140	1,400	1.31	1.50	1.94	2.72	9.58	20.35
140	1,600	1.30	1.49	1.72	2.38	8.30	17.60
140	1,800	1.30	1.49	1.66	2.16	7.33	15.37
140	2,000	1.29	1.48	1.65	1.98	6.56	13.65
140	2,200	1.29	1.47	1.64	1.89	5.94	12.30
140	2,400	1.28	1.47	1.63	1.88	5.46	11.23
140	2,600	1.28	1.46	1.62	1.86	5.07	10.35
140	2,800	1.28	1.46	1.62	1.85	4.76	9.69
140	3,000	1.27	1.46	1.61	1.84	4.55	9.17
140	3,200	1.27	1.45	1.60	1.83	4.43	8.85
140	3,400	1.27	1.45	1.60	1.82	4.35	8.60

(*Table* 1 *continued next page*)

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"FLEX-SET" PREFORMED YELLOW STRAND

TABLE 1—(Continued)
Values of Formation—Volume Factor

SAMPLE "C"

Temp. (° F.)	*Pressure (Lb. Sq. In.)	Gas/Oil Ratio (Cu. Ft. per Bbl.)					
		421	739	1,042	1,425	5,280	10,980
180.....	400	2.28	4.90	6.30	....	....	....
180.....	600	1.49	3.36	4.87	....	....	....
180.....	800	1.37	2.48	3.71	5.31	....	....
180.....	1,000	1.36	1.97	2.95	4.31	15.95	31.70
180.....	1,200	1.36	1.66	2.46	3.55	12.90	26.25
180.....	1,400	1.35	1.55	2.12	3.03	10.83	22.57
180.....	1,600	1.34	1.54	1.87	2.66	9.33	19.62
180.....	1,800	1.34	1.53	1.72	2.38	8.27	17.28
180.....	2,000	1.33	1.53	1.71	2.17	7.42	15.44
180.....	2,200	1.33	1.52	1.69	2.01	6.70	13.92
180.....	2,400	1.32	1.51	1.68	1.97	6.13	12.70
180.....	2,600	1.32	1.50	1.67	1.95	5.69	11.70
180.....	2,800	1.31	1.50	1.66	1.93	5.31	10.91
180.....	3,000	1.31	1.49	1.65	1.92	5.04	10.30
180.....	3,200	1.31	1.49	1.64	1.91	4.86	9.89
180.....	3,400	1.30	1.48	1.64	1.89	4.74	9.65

SAMPLE "C"

Temp. (° F.)	*Pressure (Lb. Sq. In.)	Gas/Oil Ratio (Cu. Ft. per Bbl.)					
		421	739	1,042	1,425	5,280	10,980
199.6....	400	2.57	5.12	....	....	....	....
199.6....	600	1.64	3.53	5.09	....	....	....
199.6....	800	1.40	2.59	3.92	5.56	....	....
199.6....	1,000	1.39	2.06	3.05	4.48	16.65	34.80
199.6....	1,200	1.38	1.73	2.56	3.69	13.60	28.25
199.6....	1,400	1.37	1.57	2.22	3.11	11.57	23.85
199.6....	1,600	1.37	1.56	1.95	2.73	10.00	20.65
199.6....	1,800	1.36	1.55	1.77	2.45	8.80	18.07
199.6....	2,000	1.36	1.55	1.74	2.28	7.83	16.15
199.6....	2,200	1.35	1.54	1.72	2.06	7.11	14.62
199.6....	2,400	1.34	1.53	1.71	2.00	6.51	13.32
199.6....	2,600	1.34	1.52	1.70	1.98	6.03	12.32
199.6....	2,800	1.34	1.51	1.68	1.96	5.61	11.49
199.6....	3,000	1.33	1.51	1.67	1.94	5.29	10.82
199.6....	3,200	1.33	1.50	1.66	1.92	5.09	10.35
199.6....	3,400	1.32	1.49	1.66	1.91	4.96	10.04

* All values of pressure are absolute.

dead crude by the addition of varying quantities of a constant-composition gas must be applied with caution. In fields producing simultaneously from oil and gas-cap intervals which are in contact, the specific gravity of the produced gas should vary with the gas/oil ratio in somewhat the same manner as indicated by the curves in Figure 1. Experience with a number of determinations from a particular field has indicated that a gas-specific-gravity gas/oil ratio relation determined from a study of a large number of wells producing the same gravity of crude compares extremely well with a similar relation obtained in the laboratory by adding varying amounts of gas obtained from the high-pressure separator to saturated liquid from the same separator.

The range of important variables covered in these tests was as follows:

Sample	Pressure (Lb. Per Sq. In.)	Temperature (Deg. F.)	Gas/Oil Ratio (Cu. Ft. Per Bbl.)
A	0-3,000	100-198	175- 836
B	0-3,000	100-191	659-10,690
C	0-3,000	100-199.6	421-10,980

Inasmuch as the questions for which these determinations were made were concerned more with the two-phase region than the liquid region, bubble-point trends were not as completely defined experimentally in some ranges as would have been desirable for the purpose of this paper. However, sufficient data on other mixtures of similar nature have permitted reasonable extrapolation and interpolation throughout these ranges.

Table 1 indicates values of formation-volume factors obtained from large-scale correlation charts of the experimental data. Inasmuch as in many flow problems values of specific volumes are of importance, the relationship between gas/oil ratio and a conversion factor C given by the equation:

$$V = CV_F$$

is indicated in Figure 2. In the above equation:

V = specific volume of mixture, cu. ft. per lb.

V_F = formation-volume factor, or volume occupied by a unit volume of residual crude when in equilibri-

FIGURE 3

Effect of Crude Gravity upon Gas Gravity for Various Gas/Oil Ratios.

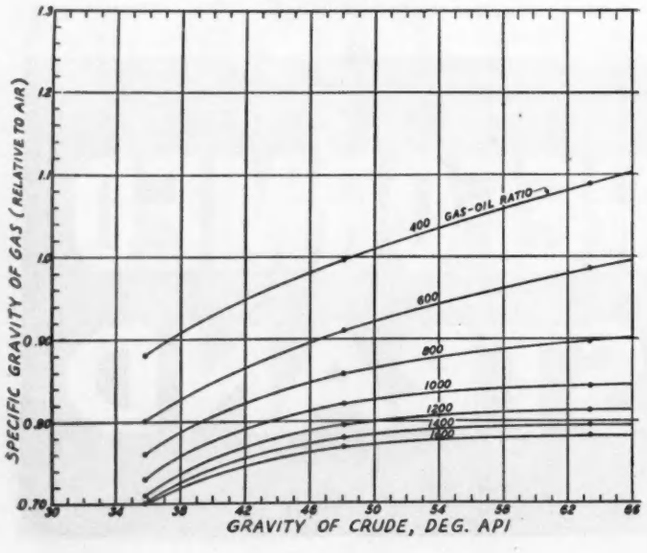
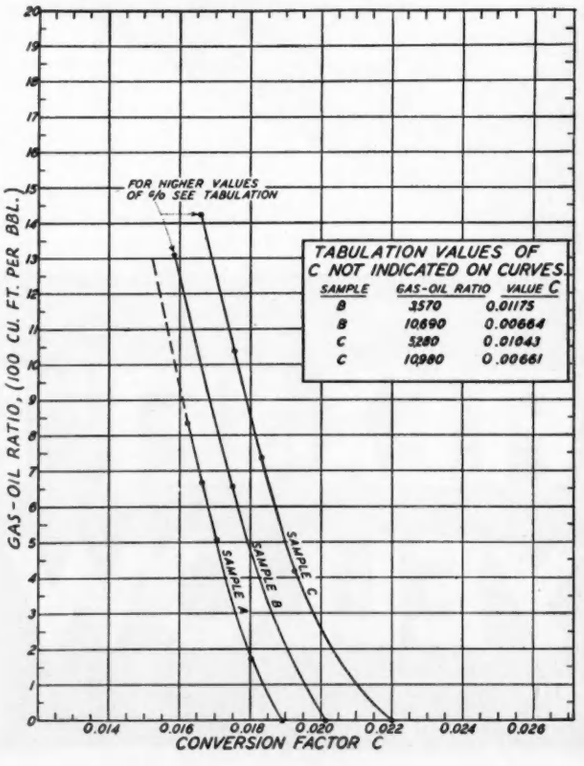
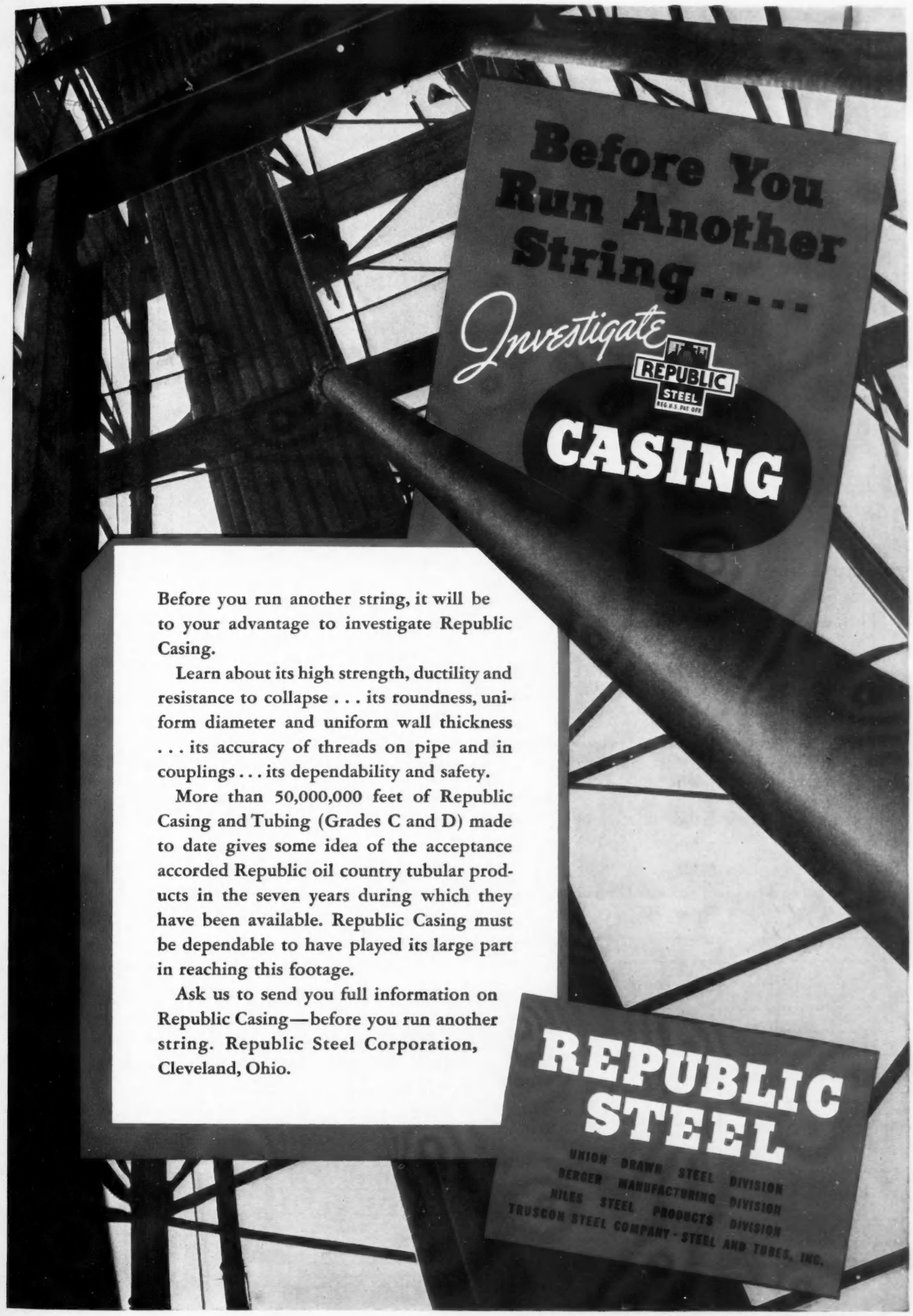


FIGURE 2

Relationship between Gas/Oil Ratio and Factor for Conversion of Formation Volume to Specific Volume.


GAS-OIL RATIO, (100 CU. FT. PER BBL.)
CONVERSION FACTOR C
FOR HIGHER VALUES OF G/O SEE TABULATION
TABULATION VALUES OF C NOT INDICATED ON CURVES
SAMPLE | GAS-OIL RATIO | VALUE C
B | 3570 | 0.01175
B | 10690 | 0.00664
C | 5280 | 0.01043
C | 10980 | 0.00661
SAMPLE A
SAMPLE B
SAMPLE C



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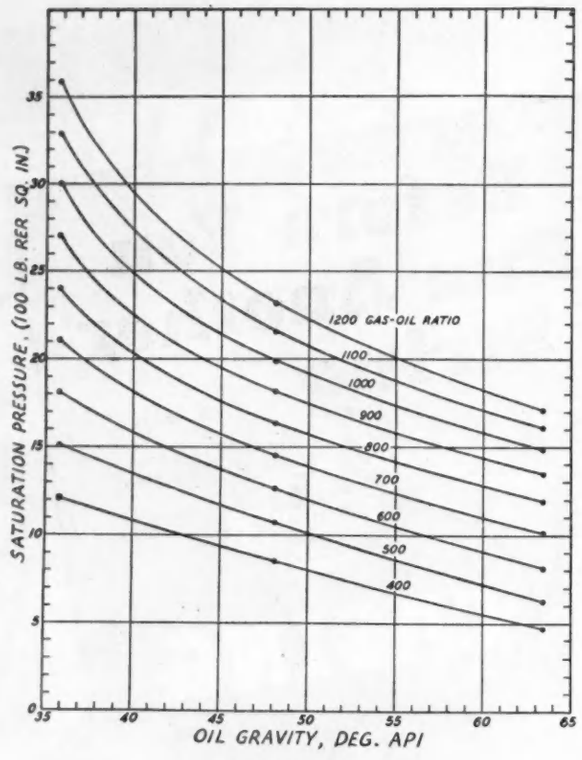


FIGURE 4
Effect of Oil Gravity upon Saturation Pressure at 100° F.

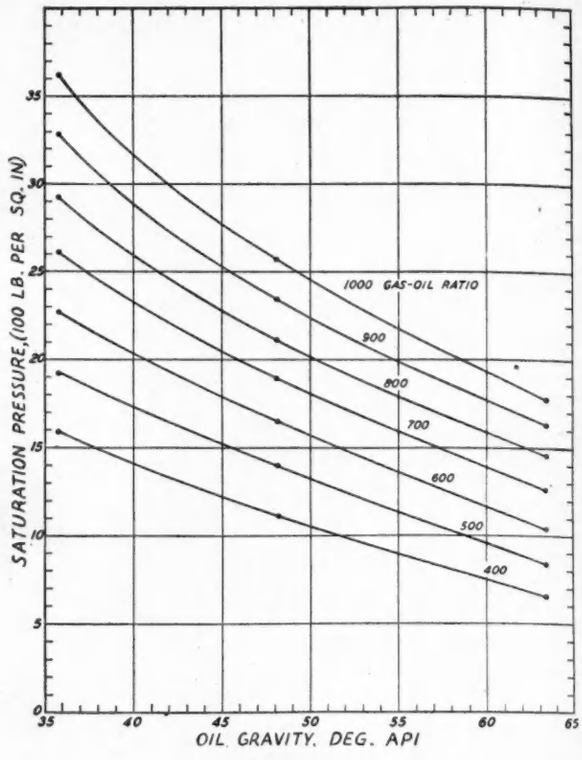


FIGURE 5
Effect of Oil Gravity upon Saturation Pressure at 200° F.

um with the specified quantity of gas at the specified pressure and temperature.

Figure 3 indicates a correlation between gravity of crude and specific gravity of gas for various gas/oil ratios. It is to be noted that in the lower oil-gravity and gas/oil ratio range, relatively small changes in oil gravity effect a material alteration in gravity of gas. It is to be expected then that, in these ranges, such factors as solubility will be influenced materially by this behavior.

Figures 4 and 5 indicate correlations of saturation pressure and residual crude gravities for a series of gas/oil ratios for temperatures of 100 and 200 deg. F., respectively. The indicated departure from approximate linearity of these curves in the lower-gravity higher-ratio range results in part from the more rapid rate of change of gravity of gas with gravity of crude in this same range.

Figures 6 and 7 indicate correlations between gravity of residual crude and bubble-point–formation-volume factor for a series of saturation pressures at

FIGURE 6
Effect of Oil Gravity upon Saturated-Liquid Formation-Volume Factor, 100° F.

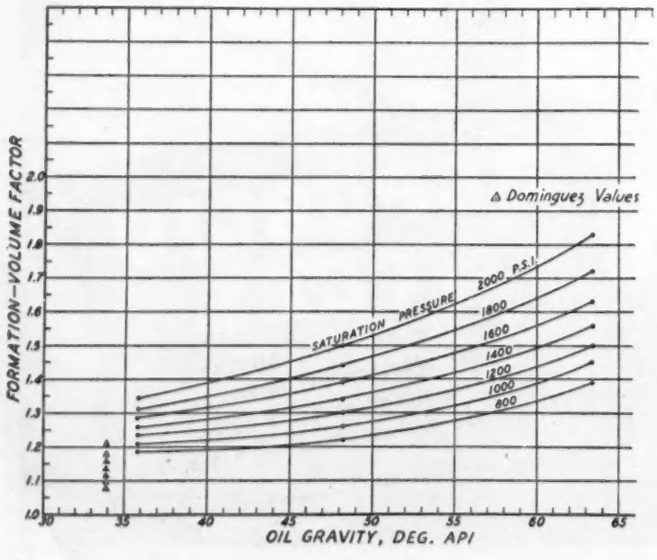
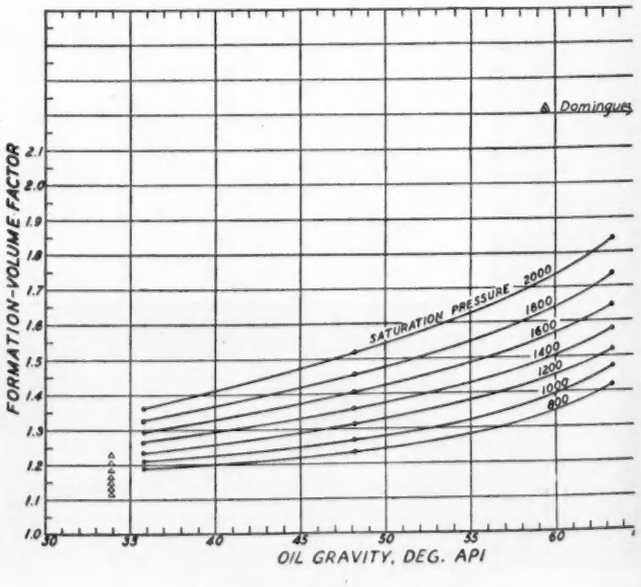


FIGURE 7
Effect of Oil Gravity upon Saturated-Liquid Formation-Volume Factor, 190° F.



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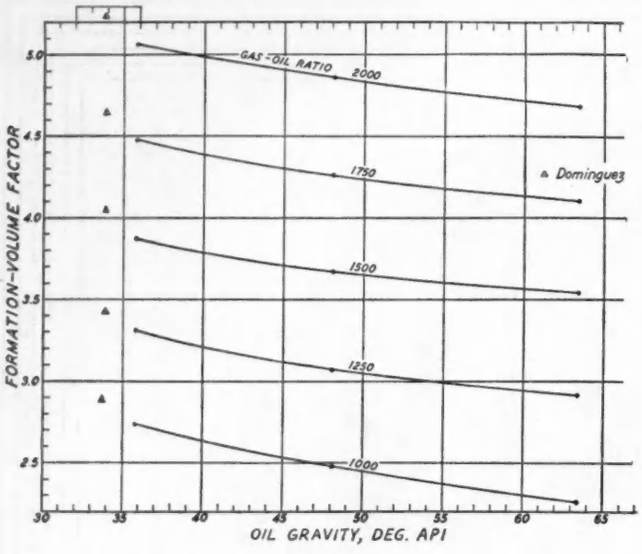
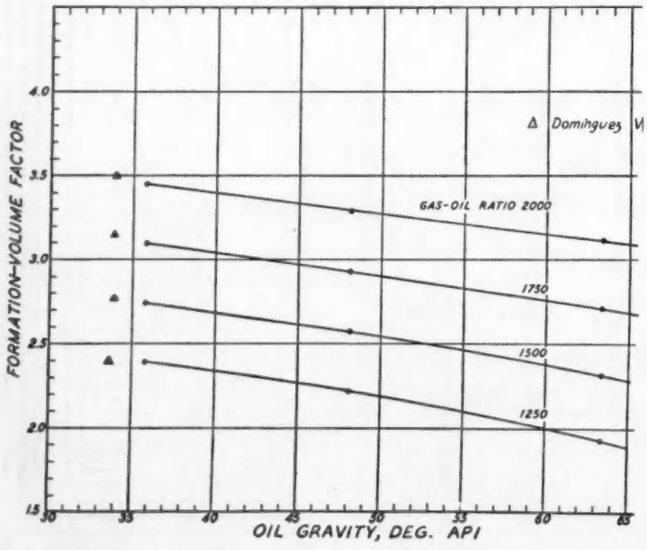


FIGURE 8
Effect of Oil Gravity upon Formation-Volume Factor.

temperatures of 100 and 190 deg. F., respectively. As a matter of interest, and to emphasize that mixtures of crudes and gases from different sources do not follow necessarily similar trends, values obtained from results obtained by Sage and Lacey[2] on a crude with a gravity of 33.9 deg. API, from the Dominguez field, are also shown in Figures 6 and 7. Our present knowledge of the behavior of hydrocarbon systems is not sufficient to explain with assurance the departure of these values from the indicated trend of the curves. In this instance, however, it is suggested that the apparent lower solubility of the Dominguez gas may account for the differences noted. For example, extrapolation of the curve shown in Figure 4 for a saturation pressure of 2000 pounds, and for an oil gravity equivalent to that of the Dominguez crude, indicates a solubility slightly in excess of 600 cubic feet per barrel. For the same pressure and temperature, the Dominguez determinations indicated a solubility of only 475 cubic feet per barrel. The lower solubility in the case of the Dominguez crude is considered due primarily to the lower average molecular weight of the gas utilized—the specific gravity being approximately 0.66 relative to air, as compared to 0.78 for the comparable San Joaquin Valley Miocene sand crude case.

FIGURE 9
Effect of Oil Gravity upon Formation-Volume Factor.
Pressure, 1,000 lb. per sq. in.
Temperature, 100° F.
Pressure, 2,000 lb. per sq. in.
Temperature, 190° F.



Figures 8 and 9 indicate correlations between gravity of residual crude and formation-volume factor in the two-phase region for a series of gas/oil ratios at two equilibrium conditions. Interpolated data for the Dominguez results again are indicated. It is to be noted that the formation-volume factor decreases with increase in crude gravity—which tendency results mainly from the increase in solubility of gas with gravity of oil. The Dominguez values show better agreement with the correlation in the two-phase region than for bubble-point liquid. In this instance the relative volumes of atmospheric phases are the same in the two cases; the variation in equilibrium volume results from the differences of amount of gas in each phase, the difference in contribution to liquid-phase volume per unit of dissolved gas, and the difference in compressibility of the material in the gaseous phase.

As a matter of interest, it may be mentioned that during the progress of the tests on the three samples some considerable difficulty was encountered at times in obtaining equilibrium of material. This was due to the separation of a second liquid phase of an asphaltic nature. It was impossible, with the type of apparatus and methods employed, to delimit the range of conditions over which this material dropped out—although there was evidence that it was fairly persistent. Sage, Webster, and Lacey[3] encountered a similar condition in connection with addition of methane to a composite Santa Fe Springs crude, and the authors have had like experiences with crude and gases from various San Joaquin Valley fields. An asphaltine type of substance has been encountered as a hard, black dissemination within the cores of producing sands from one of these fields, and several gradations in consistency of similar material is deposited in the flow strings and connections of wells producing from this field. Unfortunately, the exact cause of the separation of this additional phase is not well understood. It may be due to insolubility of certain of the higher-molecular-weight components in the liquid phase resulting from change in total composition of the system or from changes in equilibrium pressure and temperature at constant total composition. The practical importance of this property of certain types of naturally-occuring hydrocarbon systems, insofar as it may reflect considerable loss in productivity of wells as well as accumulation in equipment, would indicate the desirability of a more complete understanding of the phenomenon.

Acknowledgment

The authors are grateful to the Standard Oil Company of California for permission to present the material contained in this paper.

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[3] Sage, Webster, and Lacey, "Phase Equilibrium in Hydrocarbon Systems, XV," *Ind. Eng. Chem.* 28, 984 (1936).

WORLD DEVELOPMENT and TECHNOLOGY

Edited by
WM. V. GROSS, Associate Editor

Mexican Muddle

Washington officials studying decision of French court barring confiscated oil from world commerce

United States officials study Mexican problem

United States officials at Washington late last week were studying the details of a recent decision of the district court at Havre, France, which it is believed will close French and British markets to further shipments from Mexico of oil confiscated from American and British companies.

The decision, rendered late last month, approved an attachment granted October 7 by a lower French court to the Mexican Eagle Oil Company on 12,500 tons of gasoline originating from properties originally owned by the company, a British organization.

As reported to Washington, the French court refused the demands of the importers for release of the gasoline on three fundamental bases:

(1) "That from the evidence given at the hearing it was sufficiently established that the gasoline attached by the Mexican Eagle had originated from its installations in Mexico; (2) That on expropriation of the properties by the Mexican government no indemnification whatever was paid to the dispossessed Mexican Eagle and (3) That in France nobody can be obliged to cede his property other than for reasons of public utility and against a fair and previous compensation, for which precept it was not admissable to deviate on account of foreign legislation such as the Mexican expropriation decree.

"In view of the foregoing," the court declared, "all transactions in relation to gasoline made before the attachment are illegal, so that the claimants cannot be considered to have acted in good faith which also is confirmed, inasmuch as the prices for which the gasoline were offered on the French market were characteristic of pronounced dumping."

Studying Mexican Situation

Meanwhile State Department officials are continuing their study of the Mexican oil situation, hopeful that their recent success in securing an agreement on compensation for seized agrarian properties may pave the way for a satisfactory solution of the petroleum problem.

However, it was said in informed circles in Washington, that while the Mexican government has not denied its responsibility for payment of compensation, it has maintained that its own systems of valuation must determine the amount to be paid, which systems, it is declared, will practically demolish all the oil values.

Initially, it is explained, the "valuation" begins from the premise that no compensation will be made for the subsoil petroleum, contrary to definite agreements with the United States, dating from 1923, that such values would be recognized as private property, which eliminates 90 percent of the valuation immediately. Next, surface lands are valued at the tax assessment, which is notoriously below real value, and for surface installations, such as refineries, cost less depreciation is applied. Against any amount thus arrived at, Mexico would offset counter-claims against the companies, on which the Mexican government alone would pass. As a final step, Mexico would pay the trifling sum left in oil from the confiscated properties at such time and in such amounts as suited her convenience.

Problem Is Difficult

It is understood that negotiations between the Washington and Mexican governments have been handicapped by the latter's insistence upon fixing the terms upon which the properties will be valued, while at the same time the British and Dutch governments, also interested in the Mexican situation, are bringing pressure to bear upon the State Department to make no agreement along any lines which might result in the invocation of the Monroe Doctrine, should they attempt to press their claims for "adequate, prompt and effective indemnity" or "return of the expropriated properties in their original state," demanded in their notes to the Mexican government. To make matters more difficult in this respect, it has been pointed out that American interests own oil in parts of the world in which Great Britain has a predominant political or economic control, where they are more or less dependent upon England's support in protecting those properties against confiscation.

The State Department has indicated that it realizes the fact that the solution of the Mexican problem will be a guide to the status of American-owned properties in other Latin-American countries, and it has, therefore, manifested its anxiety that the Mexican solution be a proper one.

Mexican railroad denies affiliation with oil firm

An injunction to block the Mexican government's expropriation order has been asked of a local district court by the Vera Cruz & Mexican Railway, a British-owned short line operating in Vera Cruz.

The railroad said that its expropriation was ordered because the government believed it was a Mexican Eagle subsidiary.

The company asserted that while it served the Eagle, it was not in any way connected with the oil firm and that its expropriation was therefore unjustified.

Pemex has brought in well, El Plan 55, in El Plan zone, Vera Cruz, former Eagle region, with initial daily output of 1872 barrels.

Holidays are granted to Mexican workers

So as to expand domestic sales of gasoline, service stations are to be established by Pemex at strategic points along the trunk highway between Mexico City and Guadalajara, which will be formally inaugurated during the winter. Installation of the stations starts this month.

Sixteen holidays a year with full pay, in addition to their weekly paid day of rest, have been allowed the oil workers by Pemex. These lay offs are January 1, 13, and 25; February 5; Thursday, Friday and Saturday of Holy Week; May 1 and 5; August 23; September 16; October 12; November 1, 2 and 20 and December 25.

Only four holidays a year with full pay, or double wage if they are required to work, are allowed other workers.

Mexican well drillers have organized, and they announce that they can take care of all drilling operations without the aid of foreigners.

All oil plants in Mexico bear half a dozen or more cheese cloth banners, captioned, "See for yourselves how

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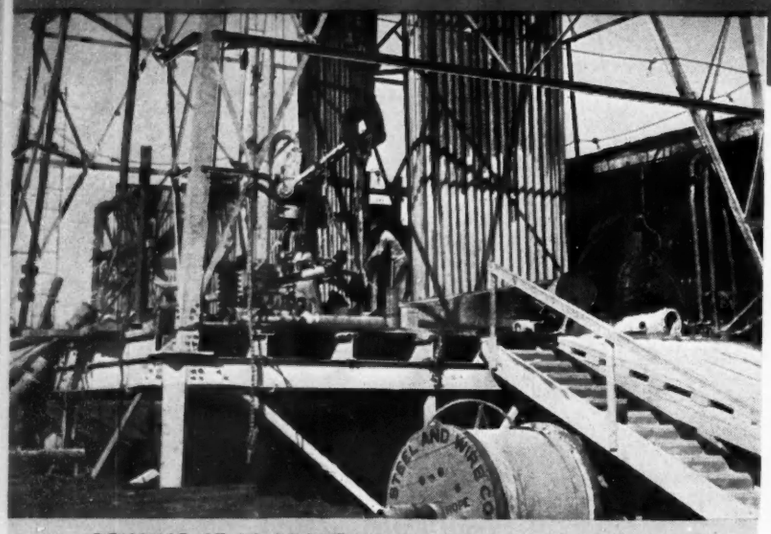
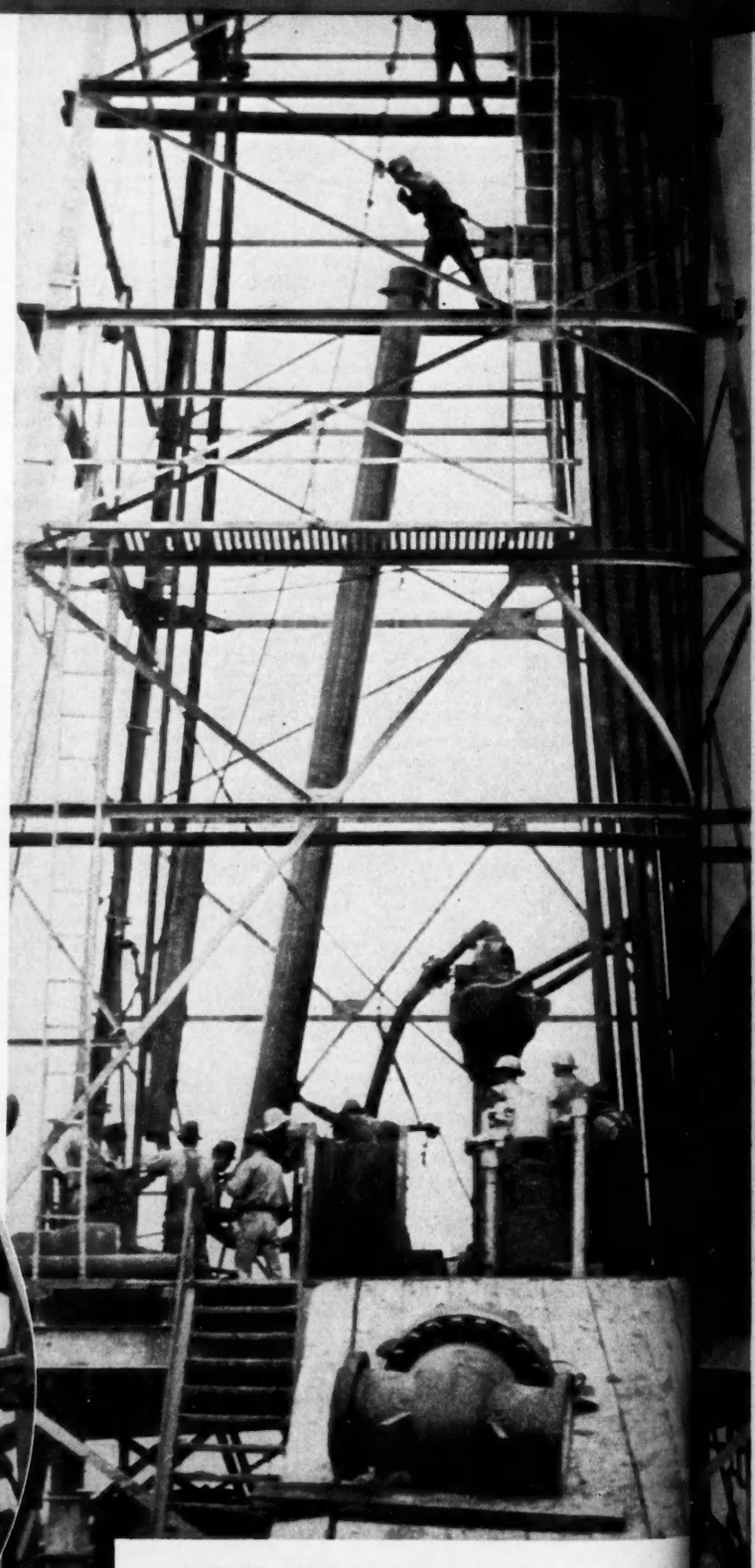


DRILLING AT 10,000 FEET *with 4½-inch O.D.* NATIONAL *Seamless Drill Pipe. In the left foreground, note part of the 10,500-foot string of 5-inch O.D.* NATIONAL *Seamless Casing to be used here, and standing in the derrick, a string of 2½-inch* NATIONAL *Seamless Tubing.*

A STRING OF NATIONAL SEAMLESS DRILL PIPE, *ready to penetrate the toughest strata thousands of feet below the surface. Drillers of this well took the surest step they knew to prevent troublesome delays. They specified America's finest, strongest drill pipe —* NATIONAL *Seamless.*

A STAB, A SPIN, AND IN SHE GOES! *Two men guiding a section of* NATIONAL *Seamless Drill Pipe into threads that are correctly designed to resist damage during making up. Twist-offs and wash-outs are mighty rare with* NATIONAL *Seamless because of its uniform wall strength — Walls Without Welds!*



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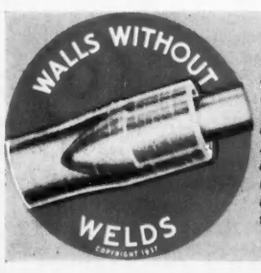
NATIONAL Tube has pioneered no less than nine important applications of the Seamless principle. Each has helped make oil production more efficient, more trouble-free. Taken as a group, these pioneering feats have saved untold sums of money by preventing costly material failures and avoiding needless interruptions.

We are proud to list these nine milestones in the march of Seamless. They are tangible evidence of the pioneering work that NATIONAL Tube has been carrying on since the oil industry began. Only by progressive achievement like this could NATIONAL Tube have earned, and held, its position of leadership.



***THE NATIONAL SEAMLESS** process consists, fundamentally, of piercing solid billets of the finest quality steel. Only sound and flawless steel can be used for piercing. Every tube is thoroughly inspected and tested at every stage in production. Every possible precaution is taken to prevent the inclusion of any weakness in the finished tube.*

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To be sure of getting the newest, most up-to-date improvements in Drill Pipe, Casing, and Tubing, always specify NATIONAL Seamless. NATIONAL's policy is to bring you finer, stronger tubular goods, and bring them to you FIRST!

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Mexicans are running the oil plants." This advertising was provoked by charges of the expropriated companies that the plants have suffered from neglect, incompetence and bad management.

Postal and telegraph services, excepting functions of the most urgent nature, were suspended for two days in a row, November 12 and 13, to glorify mail and wire employees, and on November 13 to allow these workers their regular paid day of rest. More or less impromtu holidays for Mexican government employees are becoming more frequent.

Mexican farm land situation watched

Present negotiations between Mexican and United States officials to settle their dispute over American owned agricultural lands are being closely observed from within the oil industry.

It would be of considerable significance if this 23-year old controversy should be satisfactorily settled in the near future, as such a settlement might determine the attitude of the Mexican government with reference to the expropriation of foreign owned oil lands.

Canadian Situation

Proposal for conservation law starts row in Alberta; freight rate on eastern movement may be arranged

Turner Valley operators to oppose conservation law

A measure providing for complete control of crude oil and natural gasoline production in Turner Valley, Canada's major oil field, was prepared for submission to the Alberta legislature late last week. It would give sweeping powers for making and enforcing orders to the oil and gas conservation board, even to establishing a special "police force" to enforce orders of the board.

The legislation seeks to close the door to court appeals from orders of the conservation board, which has hampered the board's activities up to the present time, and the three-man board headed by W. F. Knode, formerly of Texas, would hold office for a period of years at the pleasure of the legislative assembly.

An opportunity to appear against the measure will be granted Alberta operators when it comes before the agricultural committee of the house. Before the bill's formal introduction, members of the cabinet were informed by representatives of natural gasoline operators that if the measure is approved in its present form, a court attack would be taken before the privy council. The measure, one of seven which will come before the special session of the legislature which convened November 15, is certain to be a storm center. Protests before the agricultural committee are planned by at least 20 oil and natural gasoline well operators, most of whom will be represented by counsel.

"If the proposed act is introduced into the legislature in its original draft form, it will mean nothing more nor less than the setting up of a court to control a native industry with an American citizen as its head, and from which there shall be no appeal," said one prominent natural gasoline operator.

Turner Valley independent natural gasoline producers, in an effort to forestall enactment of legislation opposed to their interests, last week laid before the Alberta legislature a program for gas conservation. The legislature convened in special session November 15 to consider several measures, including one to be offered by the Alberta Oil & Natural Gas Conservation Board to strengthen the present conservation act.

The independent producers, who were affected by a recent conservation board order requiring natural gas wells to be held in to the available market demand for gas without regard for naphtha production, are represented by Walter Jones, of Gas & Oil Products, Ltd., operator of an absorption plant in Turner Valley, and L. L. Plotkins, owner and manager of Lion Oil Company, Ltd.

The board's order was recently challenged in the courts by Model Oils, Ltd., but determination of its constitutionality is not expected before the legislature acts on a new or revised act.

The independent naphtha producers declared the board's proposal, which was to be placed before the legislature late last week, provides that crude oil wells on the southwest flank may draw 90,000,000 cubic feet of gas daily in lifting the crude to the surface, while gas cap or naphtha wells may produce only 40,000,000 cubic feet to meet the market demand for gas. No provision is made for compensation to gas well owners for losses in natural gasoline revenue under the plan.

The proposal, according to independent naphtha producers, is not only unfair but probably illegal. As an alternative, a plan embracing the following points is being presented to the legislature:

One—That the gas produced in the crude area be divided equally among the three natural gasoline companies. In case the volume does not equal 90,000,000 cubic feet daily, that the gasoline companies be permitted to draw sufficient gas from the naphtha area to bring the total volume to 90,000,000 cubic feet per day, this gas to be furnished to the gasoline companies free of royalties as part compensation for cost of compression.

Two—That gas from the crude area be utilized to supply the Canadian Western Gas Company line, the three natural gasoline companies — British American Oil Company, Ltd., Gas & Oil Products Company, Ltd., and Royalite Oil Company, Ltd. — to participate in the gas sales equally.

Three—That the gasoline companies each install sufficient compressor capacity at their own cost to introduce 11,000,000 cubic feet daily into the producing formation at a point jointly agreed upon by the oil producers, the natural gasoline producers and the gas conservation board.

Four—That an independent appraiser be appointed to appraise the value of the naphtha wells closed in, the money to compensate the naphtha producers for their losses to be raised by charging a certain sum against each barrel of crude produced during a determined period of time.

Controversy arises in Alberta association

A serious rift between independent producers and officials of the Alberta Petroleum Association, recently organized over-all organization of the oil industry in that Canadian province, became evident last week with a demand that Herbert Greenfield, former Alberta premier and president of the association, issue a public statement on the "shelving" of an investigation of pipe line rates for transporting crude from the Turner Valley field to Calgary.

The demand was made by Maynard J. Davies, president of Davies Petroleums, Ltd., one of the principal independent producing companies operating in the field, and was accompanied by his resignation from the association. Concurrently, W. C. Fisher, managing director of Model Oils, Ltd., announced that a new association of independent operators would be formed.

Freight rates may be lowered in Canada

Canadian railway officials may accede to requests of Alberta operators seeking lower freight rates on crude shipped to Ontario refineries, it was indicated last week, with receipt by the Alberta Petroleum Association of a telegram from the vice presidents of the Canadian National and Canadian Pacific Railways inviting association representatives to meet with them and discuss rates for shipment of 6000 to 7000 barrels daily.

A preferential rate requested by Alberta producers had previously been refused. In the past few months, however, there has been considerable agitation for construction of a crude oil pipe line from Calgary to Fort William, at the head of the Great Lakes, from which point oil could be moved to Sarina and other Ontario refinery points by tanker. A British group has indicated interest in financing such a project.

During recent hearings by the Dominion tariff board, officials of the British American Oil Company, Ltd., and the Imperial Oil Company, Ltd., declared they could handle about 6000 barrels of Turner Valley crude daily without making changes in their Ontario plants.

If the negotiations between representatives of Alberta's oil industry and the railway officials are successfully consummated, Turner Valley producers will benefit considerably. Production in the field is held down to 11,500 barrels daily, about one-fifth of the po-

tential production, because of a limited market.

The action would also affect, to a small degree at least, some United States companies, as entrance of Turner Valley crude into the Ontario market will replace a part of that now being imported from the United States.

Canadian production reaches new peak

Crude petroleum and natural gasoline production in Canada during July advanced to a new high monthly record of 693,332 barrels from the preceding month's output of 537,654 barrels and the July, 1937, total of 244,931 barrels, according to a report issued by the Dominion Bureau of Statistics at Ottawa. Production during the first seven months of 1938 totalled 3,612,757 barrels compared with 1,307,544 barrels in the corresponding period of 1937.

Petroleum, asphalt and their products imported into Canada in July were appraised at $6,955,014; this represented an increase of 4 percent over the June import valuation. During July 142,585,074 imperial gallons of crude petroleum were imported, of this quantity 109,832,074 imperial gallons were obtained from the United States, 23,235,000 imperial gallons from Colombia, 6,486,000 imperial gallons from Peru and 3,032,000 imperial gallons from Venezuela.

The Canadian production of natural gas in July amounted to 1,583,803 thousand cubic feet; in June 1,717,143 thousand cubic feet were produced while in July, 1937, the output was 1,407,809 thousand cubic feet. During the seven months ending July, Canada produced 19,569,335 thousand cubic feet compared with 18,909,210 thousand cubic feet a year ago.

Refined oil imports curtailed in Italy

Italy's aim to become more self-sufficient with reference to petroleum products was demonstrated by the curtailed imports of refined products during the first 8 months of this year. According to reliable reports, imports of refined oil products into Italy showed a reduction of approximately 37 percent compared with the similar period of 1937. The most notable reductions were in gasoline, kerosene, and residual fuel oils. Imports of crude oil, however, were approximately 40 percent higher this year.

Imports of crude oil into Italy in the first 8 months of this year amounted to 988,185 metric tons, against 576,062 in the similar 1937 period, while of refined products it purchased 751,734 metric tons this year against 1,194,941 last year.

Oil for Italian Power plants restricted

A royal decree-law published in the Italian official gazette provides that all new power plants, either for public or private use, must be provided with a device for the use of solid fuel, gas, or electric power, according to a report from the office of the American Commercial Attache at Rome.

Such plants may no longer be constructed for the exclusive use of liquid fuel. Combustion plants which do not comply with the requirements will not be approved by the technical council of the national association for fuel control, it was stated.

Venezuelan production off in September

Output of crude oil in the Venezuelan oil fields in September was slightly less than in the previous month and also was moderately under the September level of 1937. For the first 9 months of this year, however, the country's production was better than 2 percent higher than in the corresponding period of 1937.

Of the 8 leading oil producers in Venezuela, only two showed increases in September over the same month in 1937. Total output of these leading companies during that month aggregated 16,178,000 barrels, as compared with 17,376,000 during the same month a year earlier. For the first 9 months of this year total production of these eight units amounted to 136,679,000 barrels, against 133,205,000 in the similar period of 1937.

Iran production

Production of Anglo-Iranian Oil Company, Ltd., in Iran in July amounted to 695,000 tons. For the first seven months of the year the production totaled 5,962,000 tons.

Netherlands Indies output about same as last year

Crude oil production in Netherlands Indies in the first 8 months of this year totaled 4,875,000 tons, compared with 4,755,000 tons in the corresponding period last year.

Australian oil imports below 1937 figure

Australia's imports of 29,709,984 gallons of crude petroleum in the first half of 1938 consisted of 13,504,008 gallons from Netherlands East Indies, 16,120,505 from Persia, 42,048 from the United Kingdom, and 43,423 gallons from the United States. The total was lower than that of 33,276,722 gallons imported in the first half of 1937. The 1938 figures showed reduced imports from Netherlands East India but a slight increase in imports from Persia.

Consumption in Chosen curtailed by rationing act

The recently inaugurated control of consumption of gasoline and heavy oil by the Chosen (Korea) government is materially curtailing use of the country's few privately owned automobiles, although the effect has been smaller on operations of taxis, buses, and trucks.

The consumers must obtain certificates for purchasing the oils, and each taxi is allotted six to seven gallons of gasoline daily, while private cars are allowed about three gallons a day.

It is expected that the rationing of supplies will freeze Chosen consumption of gasoline around the 25,000,000 used in 1937.

Chosen Oil Company is understood to be planning to double its present capitalization of Yen 10,000,000 in order to increase its refining capacity, which at present is about 250,000 tons of crude oil a year, and also to install lubricating oil refining equipment.

The coal liquefaction plant of Chosen Coal Industry Company at Agochi is reported to be in operation.

Plans for equipping automotive vehicles, especially buses and trucks, with generators for making charcoal gas to be used as fuel are apparently not progressing very rapidly. This is probably due to the high initial cost of the generators as well as to the many disadvantages inherent in the use of such a fuel. Only a few vehicles have been equipped, and their operations have not been entirely satisfactory.

Germany's imports of oil products increase

Due to the increasing demand for petroleum products in Germany, the country was compelled this year to import approximately 25 percent more crude oil and refined products. Although great strides have been made in that country to increase its domestic production to a point where imports would be practically eliminated, during the first nine months of this year approximately 3,613,000 metric tons of crude oil and refined products had to be imported. This figure compares with 3,164,000 tons of petroleum products imported into Germany during the similar period in 1937. Gasoline shipments alone accounted for 996,674 tons, an increase of 27.9 percent, while gas and Diesel oil arrivals showed a rise of 24.5 percent.

Although Germany has undergone an expanded industrial activity and furthermore has had a considerable increase in the number of motor vehicles in use this year, these two factors are not mainly responsible for the increase of imported products. It can hardly be doubted that a further important reason is to be found in the present political situation of that country which made large-scale additional foreign purchases necessary.

Netherland India prospects not considered bright

According to a recently published article in the Java Bode, the prospects for future petroleum production in Netherland India are not particularly promising. Efforts of oil companies to find new reserves in the vast exploration and exploitation areas conceded to them in the past seven years have been generally unsuccessful, according to the article.

The conclusion was reached that the Indies are not rich in petroleum, having nothing to compare with the East Texas or Baku fields, and that the last hope, excepting some unforeseen luck, lies in the possibility that commercial fields may be found in New Guinea.

According to the article, the refinery at Soengei Gerong, Palembang, will have to reduce its daily output from 40,000 to 35,000 or 30,000 barrels a day within the next year or two, if new fields are not discovered.

Japanese plan to use shafts in oil areas

The Japanese ministry of commerce and industry is reported to be advocating the use of shafts in oil development, a method which has not been employed heretofore in Japan but which has been successful in France and Germany. The government is expected to subsidize prospecting for oil and drilling under the new method for the next five years, with an expenditure of about Yen 15,000,000 for 240 localities. The subsidy for the next fiscal year is said to be about Yen 4,500,000 for 150 localities.

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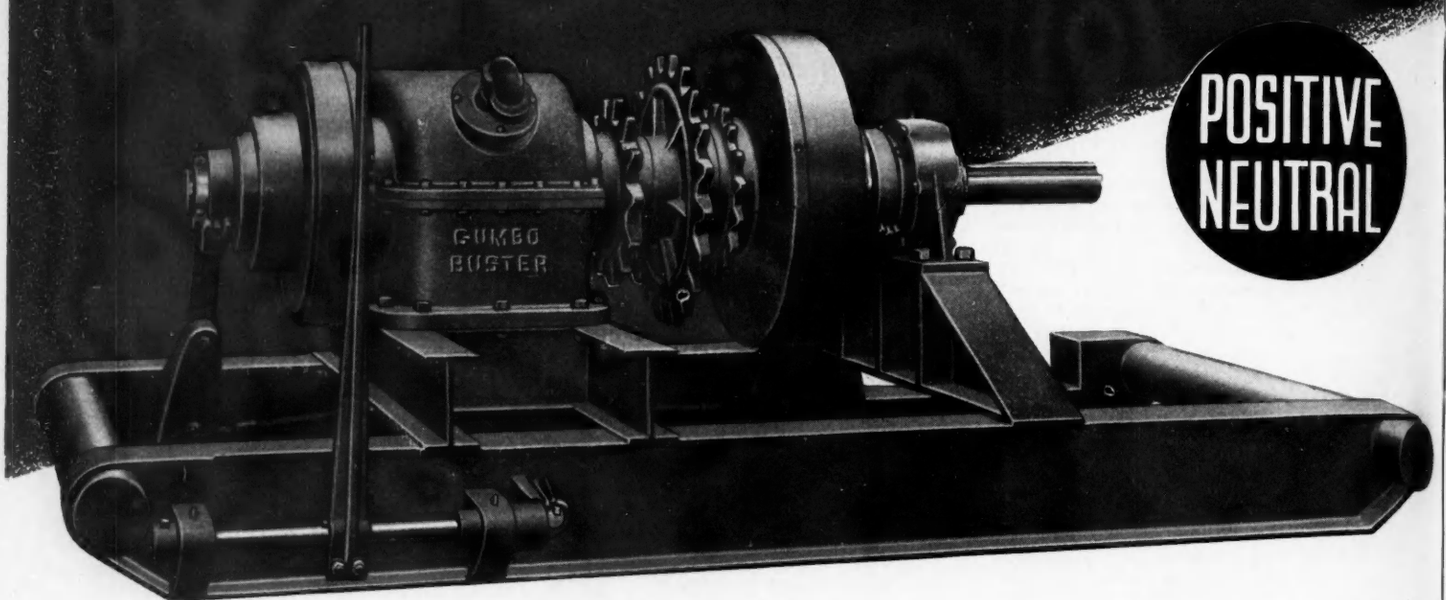

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MEN IN THE INDUSTRY'S NEWS

RECTOR C. BROWN, district foreman for Magnolia Petroleum Company at Crane, Texas, has recently been transferred to St. Elmo, Illinois, and promoted to superintendent.

TOM F. PETTY, geologist for Humble Oil & Refining Company, was elected president of the North Texas Geological Society at its recent meeting at Wichita Falls, Texas.

J. D. SCHWANECKE, scout for the Ohio Oil Company, Houston, is on a delayed vacation.

BRUCE HAYNES, scout for the Pure Oil Company at McAllen, Texas, was in Houston last week.

WINSTON P. HENRY and **GEORGE A. HILL, JR.,** have been appointed members of a subcommittee of 11 of the special study committee of the Independent Petroleum Association of America. This subcommittee is to study the questions of pipe line divorcement and complete disintegration of integrated companies.

PAT C. MURPHY, with Phillips Petroleum Company, has been transferred from Shreveport, Louisiana, to Houston to take charge of the company's drilling activity in the new League City area.

HERSCHEL H. COOPER, consulting geologist of San Antonio, Texas, was the principal speaker at the weekly meeting of the Houston Geological Society November 17. His subject was "Producing Zones in South Texas in the Jackson and Older Formations."

FRANK C. ROPER, consulting geologist of Houston, returned last week from a successful deer hunting trip to Colorado County, Texas. He proudly displayed a nine pointer to his local friends.

JULIUS FOHS, president of Fohs Oil Company, Houston, is in New York. En route to the East he stopped over in Chicago to attend the American Petroleum Institute's annual convention.

DAN MORAN, president of Continental Oil Company, Ponca City, Oklahoma, was in Houston last week.

LATEN STANBERRY, Chief Supervisor of Oil and Gas for the Texas Railroad Commission during the past four years, has resigned effective December 1. The resignation was viewed as a direct result of the political situation caused by the defeat of C. V. Terrell as railroad commisioner.

Stanberry had been with the commission for many years, and was among the first employees when this branch of the state government was organized in 1918.

Stanberry said that he is entering private business, but declined to state whether he had definitely accepted any offer.

Meanwhile, the railroad commission made no appointment of a successor to Stanberry. Chairman Ernest O. Thompson said that so far as he was concerned, work handled by Stanberry could be placed under the supervision of Director of Production V. E. Cottingham, and the state saved an annual salary of $5,000. It appeared unlikely that any appointment would be made—at least, until after Jerry Sadler takes over his work as commissioner in January.

HENRY E. LINAM, president of the Standard Oil Company of Venezuela, recently visited his home town, Shreveport, Louisiana. Commenting there on the international oil situation, he expressed the opinion that oil companies in the future would push their development programs most actively in countries where their investments are protected by conservative and friendly governments. He pointed out that, due to the cooperation of the Venezuelan government, the country has almost reached second place in oil production among the nations of the world.

FREDERICK G. CLAPP, consulting geologist, New York, returned early in November, after having been in the Near and Middle East for nearly three years, with very little interruption. He made extensive explorations in Iran and Afghanistan, with geological parties working from the Oxus to the Sea and from central Iran as far as eastern Afghanistan.

C. L. THOMPSON is president of the Vendome Petroleum Corporation, a British firm that has established offices in the Hibernia Building at New Orleans and will undertake its first test in St. Bernard Parish. Other officers are R. J. McRae, vice president, and Charles B. Murphy, secretary.

LATEN STANBERRY
Quits as Chief Supervisor for Texas Commission.

GEORGE HAMMAN, with Hamman Exploration Company, Houston, has definitely recovered from injuries he received in an automobile accident recently near Bay City, Texas.

DR. GUSTAV EGLOFF, Universal Oil Products, Chicago, has been appointed chairman of the scientific committee of International Petroleum Exposition, a post which he filled for the last exposition.

R. B. (BOB) CURRAN, chief scout for Carter Oil Company, Tulsa, is now on vacation. He will return to his office this week.

R. CHENEY HART, president of Clyde-Texas Oilfields Company, left New York last week to visit company properties in the K.M.A. field of Texas.

MAX PRAY, independent operator active in the Illinois basin area, has returned to Vandalia after accompanying the body of his wife to California for burial following her fatal automobile accident recently.

EDWARD BOUWSHA, president of the Commonwealth Pipe Line Company, Holland, Mich.; Charles VanVleck, representative of the Independent Petroleum Producers Association of America, Tulsa, and Floyd A. Calvert, president of the Oil and Gas Association of Michigan, Saginaw, addressed a recent meeting of Michigan oil producers at Holland.

PAXTON GRAY, Centralia operator, returned to the Illinois basin last week after making a round trip to Mexico City by air. He was accompanied by Kermit Smith, assistant district attorney of Longview, Texas.

JACK MEYERS and FRANK CLARK, Oklahoma City operators, are planning operations in the Birk City pool of Henderson and Daviess counties, Kentucky. They were in the field last week.

JOHN McFAYDEN, vice president and manager of western operations of the Ohio Oil Company, returned last week to Wyoming from a trip to the company's main offices at Findlay, Ohio.

BERNARD A. (BUD) RAY, former assistant to Don Wines, Kansas district geologist for Tide Water Associated Oil Company, has been transferred to Owensboro, Kentucky.

K. R. TIES, former chief engineer for E. H. Moore, Inc., is entering private practice as general consulting engineer at Tulsa.

CLARENCE E. BREHM, formerly with the Geographical Research Corporation and the Amerada Petroleum Corporation, has been named chief geologist for the Kingwood Oil Company at Effingham, Illinois.

GENERAL C. H. MITCHELL and COLONEL A. L. BISHOP were named to the directorate of Consumers Gas Company, of Toronto, Ontario, last week to fill

vacancies caused by the resignation of A. H. Campbell and the death of Thomas H. Wood. Other directors, who were re-elected, are T. Bradshaw, president; Colonel J. F. Michie, vice president; A. R. Auld, L. Goldman, W. C. Laidlaw, C. S. Macdonald and F. G. Osler. General manager and secretary of the company is E. J. Tucker.

ROBERT DREYFUS heads a geophysical crew of Gulf Refining Company making surveys in southern Indiana and for which an office was established last week at 9 Main Street, Evansville.

FRED M. MANNING, Denver, is president of Manning & Martin, Inc., which last week was granted a charter to do business in Illinois with a stated capital of $134,000.

R. P. JOHNSON, E. C. Wharf and C. Umfleet last week organized the Orchard Oil Company, Inc., as an Illinois corporation. Headquarters will be maintained at 316 East Cherry Street, Olney.

GEORGE D. FOSTER, secretary of the Devonian Oil Company, returned to Tulsa last week from an extended stay in the Illinois basin area. He declared he was unconvinced that the Mid-Continent area is not still the oil man's "best bet."

DR. J. J. DEANER, Okmulgee operator and discoverer of the Deaner pool, stopped in Evansville, Indiana, for a quick look around the southeastern part of the basin area before going on to Chicago for the A.P.I. meeting. He left Evansville with R. E. (Bob) Garland, who has recently established an office in Evansville and is operating extensively in the basin area.

FRED T. HILDT, Tulsa, is considering opening an office in Evansville, Indiana, he said when in that city last week.

DONALD H. MacIVOR, Wichita operator, was in St. Francis hospital in that city last week for treatment of a throat affliction. His condition was described as good.

D. A. LITTLE, L. S. Sinclair and W. H. Francis last week incorporated the Magnolia Pipe Line Company of Illinois as a $150,000 corporation with headquarters at 208 South LaSalle Street, Chicago.

C. D. (PAT) NEFF, independent operator, was in Evansville, Indiana, last week arranging a three-well drilling program in that area.

HARRY (LIGHTHORSE) COOPER, Kansas scout for Indian Territory Illuminating Oil Company, has been transferred to Bartlesville, Oklahoma. He is being succeeded in Kansas by J. C. McFarland.

R. E. (BOB) BATES, superintendent of drilling for Sun Oil Company in the East Texas field, has been transferred to Southwest Texas to fill the same position in the latter district. He is residing temporarily at Rio Grande City since the company's principal operations are now in the nearby Sun field.

JAMES C. REID, general superintendent of Southern Union Gas Company, Dallas, has been elected a member of the board of directors.

PAT ENDOM, former field clerk in Sun Oil Company's Kilgore, Texas, production office has been promoted to chief field clerk, with headquarters at Dallas.

N. O. WATSON, general manager of Caribbean Petroleum Company, Maracaibo, Venezuela, left by air clipper November 14 for The Hague, Holland, but will stop in the United States enroute.

F. C. LAURIE, general manager of Lago Petroleum Company, Maracaibo, returned from a lengthy visit to eastern Venezuela and Trinidad in time to show the way home to a fleet of racing Star sailboats on the lake November 12. "Poppa" Laurie left the fleet on the way to the first buoy and continually increased his lead till he crossed the finish line.

A. HUMPHREYS, resident engineer of Venezuelan Oil Concessions at Lagunillas field, Venezuela, recently left on vacation and is being relieved for that period by W. T. Mendell.

W. C. McAULD, field superintendent for Venezuelan Oil Concessions in Tia Juana field, expects to leave the latter part of November for a vacation abroad. He will be gone about three months.

F. H. BROWN, field superintendent at Cabimas for Venezuelan Oil Concessions, left Maracaibo November 20 for foreign vacation.

P. E. NOLAN, chief geologist for Mene Grande Oil Company at Maracaibo, Venezuela, recently returned from a trip to the United States.

JOE NETICK, for whom the Netick field of Venezuela is named and who is the chief geologist and representative in Maracaibo for Orinoco Oil Company, a Pure Oil Company subsidiary, returned to the lake in November after a trip to California and Texas.

CARL BREMMER, geologist with Standard Oil Company of California, is spending a month in Venezuela, headquartering temporarily at Maracaibo.

DIED:

ULYSSES LINCOLN McCRACKEN, 73, extensive lease holder and oil broker of Wichita, Kansas, died last week in a Wichita hospital. Surviving are three brothers, a nephew and a niece.

J. H. GIESEY, 77, co-founder of the Reed Roller Bit Company, Houston, died in a local hospital, November 13.

Formerly the personal architect for the Mellon family of Pittsburgh, Giesey came to Houston in 1919 to join his friend, C. E. Reed, in the formation of an oil field tool company. His investment of $7,500 was the first to be made in the Reed Roller Bit concern. Until his illness two months ago, he was serving as company architect.

Giesey is survived by his widow, a daughter and three brothers.

HARRY J. THOMPSON, 54, employe of The Texas Company's engineering department in North Texas for the past 5 years, was fatally stricken November 10 at his Fort Worth residence. He was the chief draftsman for the Heydrick Mapping Company, Wichita Falls, from 1919 to 1933, and previously worked for the Carter Oil Company, Tulsa. Survivors include his wife and a son, Harry J. Thompson, Jr.

ROY V. HAMILL, 42, general superintendent for the T. G. Shaw Oil Corporation, Fort Worth, died November 14 in a Big Spring, Texas, hospital several days after being stricken with pneumonia. He was head of the company's operations for more than a decade, and maintained residence at Graham, Texas.

LEO DODD, 31, general construction superintendent of the Columbia Carbon Company in the Texas Panhandle, died November 12 in an Amarillo, Texas, hospital from injuries sustained the day previous near Sunray. His body was crushed when caught between two tank cars being spotted by a switch engine.

Houston Geological Society elects new officers

At a recent meeting of the Houston Geological Society, the following new officers were elected for the year 1939:

Perry Olcott, with Humble Oil & Refining Company, president; Russell A. Weingartner, with Stanolind Oil & Gas Company, vice-president; and Carleton D. Speed, Jr., with Speed Oil Company, secretary-treasurer.

The advisory committee elected includes: Olin G. Bell, with Humble Oil & Refining Company; Hugh T. Richardson, with Standard Oil Company of Texas; and Wm. F. Calahan, with Union Producing Company.

New chart depicts petroleum transportation and storage

"Petroleum Transportation, Storage, and Marketing," the third of three charts showing fundamental operations of the petroleum industry has been published by the American Petroleum Institute. The other charts in the trilogy are "Petroleum Drilling and Production," presenting word and picture description of drilling and producing operations, and "Petroleum Products," with a list of products and a refinery flow chart.

The new chart depicts the movement of crude oil from well to refinery by tank car, tank ship, and pipe line, and the movement of refined products to market and to consumers by tank ship, tank truck, and tank car. Also presented is a picture showing the retail distribution and utilization of petroleum products, and a map showing oil and gas fields, refining areas, and pipe line and tank ship routes.

The chart is in two sizes, the wall size, or 17 x 22 inches, being in two colors, and the small size, 8 x 10½ inches, being in black. Copies of the large chart are available at 5c each, with discount for quantity, while the small chart is available gratis in limited quantities, and at about 1c each for large quantities.

Copies may be obtained from the Institute's Department of Public Relations, 50 West 50th Street, New York.

THE WEEK'S NEWS SUMMARIZED

Markets

The markets of the oil industry are generally steady, and prices in the past week have remained mostly unchanged, from the oil fields to the retail outlets.

The strict allowables now prevailing are having a definitely bolstering effect on the crude oil markets, and prices appear firm in most districts.

The markets for refined products also are generally firm, as output of the refineries continues moderate, while inventories are at satisfactory levels.

Gasoline stocks now are only about the same as at this time last year, whereas earlier in the year they were far above the levels of a year before.

Fuel oil stocks are about 28 percent larger than at this time last year. But the industry is not disturbed, as demand for the lighter fuel oils is considerably higher than a year ago, while the consumption of the heavier oils by industry is expected to improve because of business betterment.

Outlook

Cheerfulness over the petroleum industry's outlook was in evidence at the annual convention of the American Petroleum Institute at Chicago last week.

Axtell J. Byles, president of the Institute, predicted good conditions in the industry at least during the first half of 1939. He said that crude oil and gasoline inventories had been brought down to fairly economic levels, that distillate inventories were satisfactory, and that the only really burdensome inventory conditions remaining were residual fuel oil and lubricating oils, which might possibly be corrected soon through the improvement in general business. Byles cautioned, however, that the oil outlook might turn less favorable if the industry should allow inventories to become excessive again next March.

Byles recommended continuance of the Interstate Oil Compact and increased membership in it among oil states, renewal of the Connally hot oil law, and enactment of adequate conservation laws in oil states not having such statutes.

Curtailment

Effective regulation of crude oil production again in December appears in prospect.

The Texas Railroad Commission indicated last week that it likely would continue Saturday and Sunday shutdowns in the final month of the year, in order to assure pipe line outlets for the 84,000 wells of the state, and to prevent pipe line proration.

At the beginning of the week Chairman Ernest O. Thompson of the Texas commission had announced that in response to his recent request, major purchasers had agreed to immediately provide markets for the approximately 500 unconnected wells in East Texas. Later information from Kilgore indicated that the wells had been promptly given the promised relief. In connection with that situation in East Texas, the purchasing companies pointed out that their ability to provide the markets depended, however, on continued restriction of allowables through the Saturday and Sunday shutdowns.

The Kansas Corporation Commission has scheduled hearings at Wichita November 25, following which allowables for December will be announced. Problems in several individual pools of the state also will be considered.

Legislation

It is not known yet whether oil-control legislation for Illinois will be recommended by the state legislative council, although that group's research department last week completed a study of the Illinois oil industry and reported its findings to the council.

The council consists of 21 members, representing both houses of the legislature. It will meet at Springfield November 21 to draft a program to be presented to the next general assembly. But the council's attitude on oil regulation has not been determined. The report by the council's research department pointed out that Illinois crude production for 1938 is estimated at 21,500,000 barrels, compared with 4,445,000 barrels produced in 1936.

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Allowable Picture

Texas operators indicate continuation of two-day shutdown is satisfactory . . . East Texas gets relief for unconnected wells . . . Refiners warned

Kansas commission will hold hearings Friday

The Kansas State Corporation Commission has announced a series of hearings for 1:30 P.M., November 25, at the Allis Hotel, Wichita. A general session will fix the December allowable for the state. Operators of Hugoton gas field will be heard to fix gas percentages and volumes. Otis gas field operators are called to establish a basis for takes in that area of Rush and Barton counties. Also to be considered is adjustment of potentials in Zenith pool of Stafford County.

Texas operators pleased with shut-down program

The attitude of operators attending the statewide proration hearing before the Texas Railroad Commission at Austin last week indicated they were satisfied with conditions and desired no change in the commission shut-down program.

Only one operator, Ray Starnes of East Texas, asked that the shut-down be abandoned. Three attorneys representing the Panhandle, some portions of East Texas, and West Texas, asked that the shut-down be continued indefinitely, but declined to argue with Starnes.

The Starnes proposal was in the nature of a formal protest based on cold logic instead of the impassioned pleas for relief which have dominated several hearings in past months. The East Texan had marshalled his legal arguments carefully, presented them in order, and calmly subsided.

Attorneys urging the continuation of the shut-down adopted the same attitude, pointing to the fact that 500 wells had recently obtained connections in East Texas because major purchasers believed the commission would continue the shut-down.

East Texas Report

After this brief interchange the commission presented its monthly East Texas report, which showed that pressures had increased an average of 1.51 pounds during the month ending November 8. The total allowable for the period was 11,936,479 barrels, and the daily average allowable was 387,047 barrels. Thus pressures increased an average of 0.127 pounds per million barrels of allowable oil.

The commission reported that the total Texas allowable for the first 17 days of November averaged 1,317,626 barrels per day, which is 53,374 barrels daily less than November consumer demand for Texas crude, as calculated by the United States Bureau of Mines. Without the four days shut-down during the 17-day period, the daily average allowable was 1,736,827 barrels.

December demand as estimated by the Bureau of Mines will be 1,343,900 barrels, some 27,000 barrels less than the November estimate. Nominations for the purchase of Texas crude filed with the commission showed a daily demand average of 1,540,929 barrels, 9009 barrels less than the November average.

Commission Chairman Thompson said that the order would not be issued for a few days, and declined to state whether the shut-downs would continue. However, there appeared to be no reason for an immediate change, as operators seemed satisfied.

Most observers believed that the shut-downs would continue through December and probably through the first two or three months of 1939, at least.

Thompson warns refiners of federal control danger

A warning to the nation's refiners was telegraphed to the A.P.I. convention in Chicago last week by Ernest O. Thompson, chairman of the Texas Railroad Commission and of the Interstate Oil Compact Commission.

Thompson charged that the refineries had overloaded on gasoline for the express purpose of breaking the price. He told them that federal control was likely a result unless they revised their operating methods.

"The progress that has been made in conservation of oil and gas is due entirely to the fact that we have confined our efforts exclusively to the prevention of actual physical waste in the production and storage of oil. This makes it legal. We must not vary from this procedure. We must not risk our success by venturing on ground of doubtful legality.

"If there be preventable physical waste in excessive storage of crude then there is even more preventable physical waste in excessive storage of gasoline. Crude production in the oil-compact-member states except Illinois (it is my understanding that Illinois will shortly pass her law) has been successfully controlled. Waste has been effectively prevented. Crude storage has been reduced materially.

"Some refiners have not played a fair game. They ran excessively and built up a leaning tower of gasoline stocks which were then used as a self-serving excuse to break crude prices. The wholesale price to retail stations was not reduced. The public took notice.

"State laws can be passed to prevent physical waste in excessive gasoline stocks. Better stay away from dangerous federal control. Look at the plight of the rails if you wish to see what federal control or regulation does to an industry. There is a limit to our efforts at production control when there seem to be those who forever seek reasons to profit unduly on the restraint of the independent producer.

"It is unfair to ask the state to hold down production while others cut the price. The independents of Texas mainly have procured passage of the wise oil laws in Texas. Our law expires next June. Independents hold in their hands the reenactment. I would recommend the consideration of these points."

Markets are provided for East Texas wells

Unconnected wells in East Texas were scheduled last week to be taken over immediately by major purchasers. An announcement to that effect was made early in the week by Ernest O. Thompson, chairman of the Texas Railroad Commission.

The purchasers, however, insisted that the Saturday and Sunday shut-downs must be continued or allowables would exceed the amount they were willing to purchase. Pipe line proration would probably ensue.

Thompson previously wired the purchasers asking that the connections be absorbed, pointing out that one object of proration was to provide a market for every well. Simultaneously he addressed letters to the Secretary of War in Washington suggesting that the government purchase the oil to build up a reserve.

Thompson estimated that there were about 500 unconnected wells in East Texas. The telegrams from purchasers indicated that they would accept additional connections as follows:

Humble, 125; Texas, 125; Shell, 100; Atlantic, 50; American Liberty, 40; Stanolind, 15. Tide Water, Magnolia and Sun indicated that they would accept some additional wells, but did not specify any number.

This apparently solves for the present the problem of unconnected wells in East Texas and should do much to quiet protests which have been heard recently.

Arkansas board to make frequent allowable changes

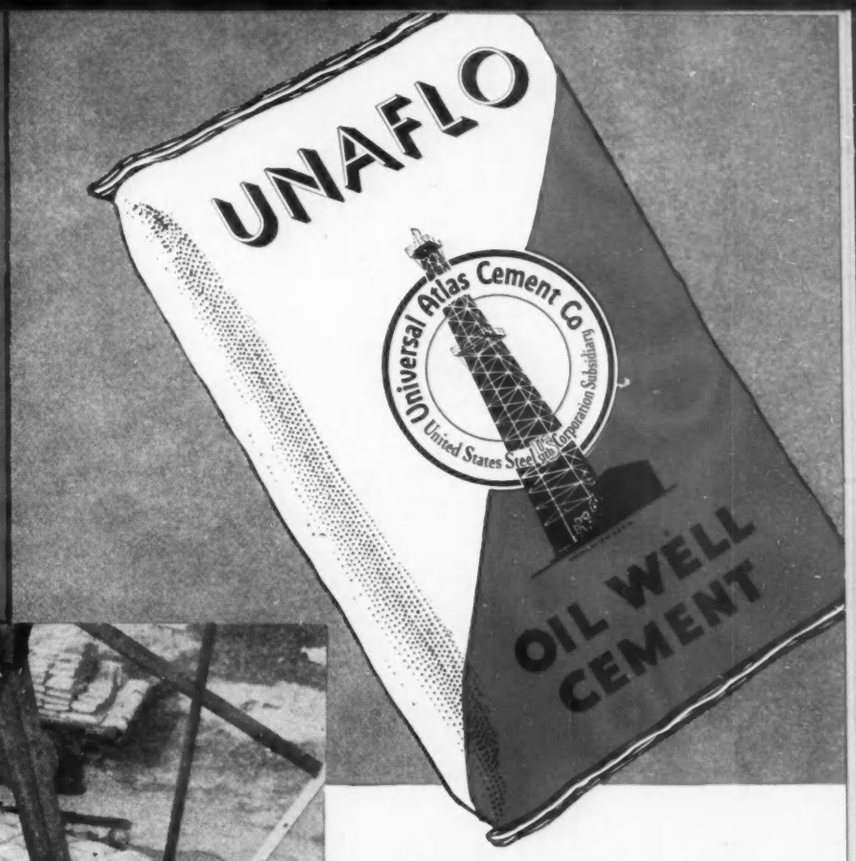
The Arkansas Board of Conservation, following a hearing at El Dorado November 12 adopted recommendations of operators that the Jones sand (lower Marine) producers in Schuler, Union County, have the daily allowable left unchanged at 15,000 barrels daily for the 101 wells in the field.

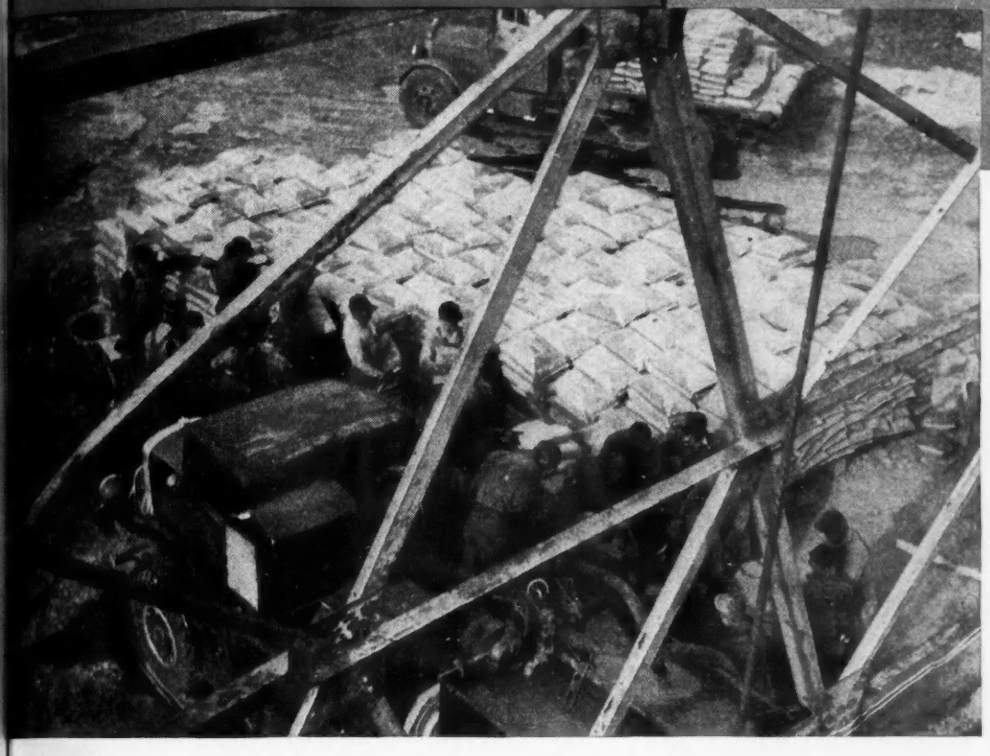
The board decided that the allowable would be corrected each 15 days between now and next January 1 to take care of new completions. Bottom-hole pressure in the Jones sand increased 41 pounds to an average of 2,825 pounds between October 10 and November 7, the board's data revealed.

The board increased the allowable from the Permian (Reynolds) lime of Schuler from 1,000 to 1,250 barrels daily. There are 5 wells in Schuler producing from the Permian and this number, operators said, probably would be increased to 7 by December 1, and to as many as 12 by January 1. New bottom-hole pressure tests will be made in December after which a new allowable will be set for that horizon.

"YOU'VE GOT SOMETHING THERE!"

—oil men tell us





Here's a Cement that Permits the Operator to Control the Job

Can you start a cementing job, go ahead ith it in the face of delays, without worry- g about whether your cement will give you ough time?

The answer is yes, if you use Unaflo. With s easy-to-pump, retarded-set oil well ce- ent, the operator controls the job instead being controlled by the time element of e cement.

Recently, in the Oklahoma City Field it was cided to protect upper sands by applying a queeze" cementing job through perforations. e cement retainer was set at 4451'. The for- tion was broken down with water at 700 per square inch.

4000 bags of Unaflo cement were mixed with e Halliburton motor driven truck.

The cement slurry averaged 16.04 lb. per gallon on 75 hydrometer determinations.

Due to waiting on water the time required was:

Mix 4000 bags Unaflo	5 hr. 15 min.
Displace cement from tubing	20 min.
Release tubing and wash back cement	18 min.
TOTAL	5 hr. 53 min.

Three weeks later same company completed a similar cementing job, using 4000 bags of Unaflo and one motor driven Halliburton truck in 5 hr. 3 min.

You'll like Unaflo. Try it on your next job. Universal Atlas Cement Co., United States Steel Corporation Subsidiary, Amicable Bldg., Waco, Texas; Kansas City; Tulsa; Oklahoma City.

A Cement for Every Oil Compan Use at Oil Well, Refinery and Filling Station

Atlas portland cement for *surface* work and for cementing *surface* casing. Unaflo cement is recommended for *deep* well work.

Lumnite cement is used in Oil Refineries for making Refractory, Insulating and Heat-Resistant Concrete Linings in Still Furnace Walls, Bottoms, Roofs, Foundations, Ducts, Flues and Stack Linings; Tube Sheet Insulation.

Lumnite cement makes Corrosion-Resistant Concrete and Mortar Lining in Distillation and Cracking Units; Re-Run Stills; Absorption Systems; Chemical Treating and Ethyl Plants.

Atlas White the cement that is pure *white* and non-staining. Exceeds specification requirements for portland cement strength. Ideal for ornamental work in connection with service station construction and repair.

U-18

Universal Atlas
CEMENTS

Bottom-hole pressure in this horizon also increased 131 pounds from October 10 to November 7.

Operators in the Miller County end of Rodessa asked the board to make additional tests of the lower Gloyd on the north end of the field and the board said this would be done starting November 21 to provide a basis for a new allowable. The present allowable of 4,300 barrels was left unchanged for the present.

Under orders of the board its engineers last week began reservoir surveys in the Magnolia and Village fields, Columbia County, as a basis for allowables.

Illinois to consider oil conservation and taxes

Oil conservation and taxing measures will be presented to the January session of the Illinois legislature, it was indicated last week with announcement that the research department of the new state legislative council has completed a study of oil production in the state.

The department's report points out that the state now has few regulations governing the industry, but makes no specific recommendations for oil control. The matter, however, will be among the subjects covered when the council meets November 21 to draft a program to be presented to the legislature, which convenes January 4.

There has been no definite indication on how the subject of oil regulation and production taxes will be revived when the legislature convenes since defeat of administration measures covering these points at the recent special session of the legislature.

The report points out that there are only seven measures on the Illinois statutes covering development of oil and natural gas, despite the fact that the state has advanced from fourteenth to seventh place in oil production in the past two years. The state's production is given at 4,445,000 barrels in 1936, and the estimated output for this year is set at 21,500,000 barrels.

A production tax, according to Dr. C. M. Kneier, research director who prepared the report, appears to be constitutional since the attorney general in 1923 held licensing of natural resources was permissible provided it did not replace a property tax. Courts of other states, he said, have upheld similar laws.

A tax of five cents a barrel on the estimated 1938 output, it was pointed out, would raise $1,075,000, while a tax of five percent of the value of oil produced, at $1.25 a barrel, would bring in $1,343,250. Letters from several county highway superintendents stating that seismograph tests were causing damage to roads and asking legislative protection were attached to the report.

Consolidation of Naval Reserves being planned

Plans for the consolidation of the government's holdings in Naval Petroleum Reserve No. 1, authorized by legislation signed by President Roosevelt, June 30, last, are under consideration in the Navy Department at Washington, it was disclosed November 20 by Secretary Claude A. Swanson, in his annual report.

However, it was indicated, no definite outline has yet been drawn nor negotiations instituted for the exchange of lands which will bring the government holdings into a block.

During the fiscal year ended June 30, last, the secretary reported, the department had a revenue of $1,028,869 from lease rentals and royalties on oil, gas and gasoline, and an additional $442 from rentals for grazing on Naval Petroleum Reserve No. 3.

The Navy Department is continuing its cooperation with the Interior Department in the effort to recover Section 36 in Petroleum Reserve No. 1.

The case, together with the case involving title to Section 16, is pending on appeal, the former involving an award of $6,164,102 to the government as damages.

Revise proration method for Goldsmith

The Texas Railroad Commission has issued an order providing for a revision of the method of handling high gas/oil ratio wells in the Goldsmith field, Ector County.

The old order provided for a total displacement factor limiting the allowable of such wells by "multiplying the ratio set for the field (5000 cubic feet per barrel of oil) by the maximum daily oil allowable of any well producing within the specified ratio . . ."

Under the new order such wells are governed by the following rule:

[6] "Any well producing with a gas/oil ratio in excess of 5000 cubic feet of gas per barrel of oil produced shall be allowed to produce daily only that volume of gas obtained by multiplying its daily oil allowable, as determined by Rules 3, 4, and 5 in the Field Rules governing the Goldsmith Field, by 5000 cubic feet. The gas volume thus obtained shall be known as the daily gas limit of such well. The daily oil allowable of such well shall then be determined and assigned by dividing its daily gas limit by its producing gas/oil ratio in cubic feet per barrel of oil produced.

Wasson field hearing brings up controversy

Operators in the Wasson field, Gaines and Yoakum counties, disagreed over the method of allocation in the field at a hearing before the Texas Railroad Commission last week.

A plan presented by American Liberty Oil Company provided for spacing wells 330 feet from lease lines. Major companies operating in the field wanted straight 40-acre spacing. A few independents, however, protested that this would not permit them to meet offsets in some instances, but they indicated that they desired no more than a well to 40 acres if it could be avoided.

American Liberty Oil Company complained that if it was forced to drill more than one well to 40 acres it would not get an additional allowable under the proration plan advanced by the majors. This provided for 50 percent acreage and 50 percent on acreage times potential.

The independent plan provided for acreage and potential with 50 percent allocated on each factor. Thus if an additional well was drilled the unit potential would rise and an additional allowance would be obtained.

This was necessary, the independents said, to pay for the extra wells they might be forced to drill.

Two oil companies plan financing programs

The Continental Oil Company, Ponca City, Oklahoma, has filed with the Securities and Exchange Commission a registration statement with respect to $21,071,600 principal amount of ten-year convertible debentures, due December 15, 1948.

The proceeds will be used in connection with the company's general program of exploring, acquiring, and developing oil and gas properties and for extending and improving its refining, transportation, and marketing facilities. It is the present plan of the company to offer to stockholders of record at the close of business on December 2, 1938, the right to subscribe for such debentures at the rate of $4.50 principal amount thereof for each share of the capital stock of the company held of record, at the price of 100 percent of the principal amount of the debentures subscribed for.

Pan American Petroleum & Transport Company, New York, announced last week a financing operation involving $9,000,000, with funds obtained from Equitable Life Assurance Society and Chase National Bank. Mortgage notes were issued by the corporation to the Equitable in the sum of $5,500,000 and to Chase National Bank for $3,500,000. The proceeds will be devoted to retirement of indebtedness to Standard Oil Company of Indiana, parent company, to the Federal Shipbuilding and Dry Dock Company, and to existing bank debt.

Sun field in Starr County ordered 20-acre spacing

Austin, Texas.—The Texas Railroad Commission has issued an order providing for 20-acre spacing in the new Sun field, Starr County. This will allow the drilling of wells 466 feet from lease lines and 933 feet apart.

The order provides for two strings of casing, including 500 feet of surface casing cemented to the surface and a 2000 pound test oil string cemented 800 feet above the shoe. A maximum gas/oil ratio of 2000/1 is provided.

Proration is to be on the basis of acreage and per well with 50 percent assigned on each factor. While 20-acre proration units are specified, a maximum of 35 acres may be assigned to the final well drilled on a lease to eliminate the necessity for drilling on fractional units.

West Panhandle hearing

Austin, Texas.—The Texas Railroad Commission has scheduled a hearing for November 29, at Austin, on the West Panhandle gas field. The commission will hear evidence upon which to base orders to prevent "waste and undue drainage of natural gas between properties in the sweet gas area of the West Panhandle field . . ."

Seminole hearing

Austin, Texas.—A hearing on the new Seminole field, Gaines County, has been scheduled for December 6, at Austin, the Texas Railroad Commission announced last week.

The purpose of the hearing is to determine the most efficient gas/oil ratio for wells in the field.

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Pipe Line News

Complete 70-mile line from Centralia field to refinery

Oklahoma field outlet . . . Tom Ball gas going north

Tom Ball gas line to tie to Southern Union

Southwest General Pipe Line Company, Dallas, Texas, is clearing right-of-way for the construction of a 21-mile 6-inch welded natural gas trunk line to extend from the Tom Ball field, Harris County, to a point near Prairie View. Connection will be made with the Southern Union Utilities, Inc.'s 6-inch carrier that supplies gas to Navasota, Brennan and other towns in the district. Both concerns are subsidiaries of Southern Union Gas Company.

Laying larger pipe for Pecos Valley outlet

Comanche Pipe Line Corporation, Midland, Texas, is building 18 miles of 4-inch oil line from the Pecos Valley district, Pecos County, to Grand Falls, Ward County, where connection is made with Atlantic Pipe Line Company. This unit will replace a smaller line that has proved inadequate since the Pecos Valley field has increased to 102 wells with a base allowable of 1207 barrels daily. Commanche Pipe Line Corporation will utilize the 2-inch line salvaged from the above unit in building 13 miles of line from its Pecos Valley booster station to the Masterson pool, which has a base allowable of 618 barrels daily from 23 wells.

Crude oil pipe line completed in Illinois

North Central States Pipe Line Company's 70-mile crude oil pipe line linking the Lake Centralia field of Marion County, Illinois, to The Texas Company's refinery at Lawrenceville was completed last week by Williams Brothers Construction Company, contractors.

The line is eight-inch to a point in Clay County, from where 10-inch pipe has been used over Richland and into Lawrence County.

Natural gas pipe line river crossing asked

Application has been made by the Kentucky Natural Gas Corporation to the war department for permission to construct a 4-inch submarine gas pipe line crossing in the Green River near Henderson, Kentucky.

Location of the crossing would be about 2000 feet upstream from the Birk City ferry crossing, and the line would be used to transport natural gas from the Henderson County field.

Simrall purchases gathering system

Simrall Corporation, affiliate of Standard Oil Company of Ohio and Michigan Toledo Pipe Line Corporation, has bought out the Arenac Pipe Line Company's gathering system in the Clayton-Arenac field, Michigan. Simrall had been a purchaser in the field prior to the sale.

Champlin completes line to new Oklahoma field

Champlin Refining Company has completed a 12-mile crude line from its refinery at Enid to the recently discovered Hillsdale pool of northwest Garfield County, Oklahoma. The firm had been trucking production from its discovery well, Boehm 1, to its refinery prior to the completion of the line. Two other wells are now drilling near the pool's discovery.

Labor Situation

Humble employes vote on new contract

For ratification of a new working agreement with the Humble Oil & Refining Company, members of the company's Baytown refinery employes' federation began balloting the early part of last week. All of the 3800 employes in the plant are eligible to ballot on the new contract, but voting on five amendments to the federation constitution and by-laws will be limited to the 2800 members of the federation.

The contract, designed to replace one approved by company and employes a year ago, grants the federation wider powers in the matter of layoffs. Seniority would be determined by length of service, educational qualifications, and efficiency.

The schedule of 36 hours a week for wage men and 40 hours a week for salaried employes is retained in the agreement and provision is made that the federation will be recognized as the sole bargaining agency.

NLRB decision favors Houston oil union

A recent decision of the National Labor Relations Board on points in conflict between the Shell Petroleum Corporation and the Oil Workers International Union's Houston chapter was regarded as favorable to the labor union.

The chief points at issue involved the status of 62 workers employed in supervisory capacities and the classification of members of four American Federation of Labor craft unions. In its decision the labor board designated the oil workers local chapter as official bargaining agent for the company's Pasadena refinery, declining to exempt the 62 workers engaged in supervisory positions. This was one of the main points at issue in the strike of the refinery last November, the corporation having claimed that these employes were not eligible for union membership.

The oil workers filed their petition last spring to be designated as official bargaining agency for the refinery.

Labor board certifies California CIO union

Certification of the Oil Workers' International Union, a CIO organization, as sole collective bargaining representative for all employees of Shell Oil Company of San Francisco engaged in the production, pipe line and refinery departments, with the exception of machinists, boiler-makers, blacksmiths, and electrical workers, was announced by the National Labor Relations Board at Washington, November 18.

The board's action was based on the recent secret run off election, made necessary by the indecisive outcome of a previous vote, which gave the CIO union a plurality but not a majority.

Mexico tries to stop rising costs by price fixing

The steady rise in living costs in Mexico during the past several months has forced the government into a price fixing experiment in an attempt to combat this evil. The dislocation of the country's internal economy resulted largely from the expropriation of foreign oil properties and the subsequent drop of the currency, and the situation has become so alarming that the price fixing program is to be put into effect immediately.

A central consultative committee has been established with nation-wide jurisdiction which will study and make recommendations on prices of essential consumers goods. The office of the Secretary of National Economy will be the actual price regulating agency and has been empowered to act on the basis of recommendations of the central committee.

A decree already has been promulgated ordering merchants to sell products only at government fixed prices; price list must be displayed in all shops.

Meanwhile in an effort to save "cooperative" (labor managed) mines from the effects of the 12 percent export tax, a decree has been issued lowering the levy on gold to 6 percent and abolishing it on other minerals. However, the new decree does not affect privately-owned independent companies, and it is feared that the discriminatory tax law may tend to drive some smaller units into the hands of the cooperatives.

Not only was the steady price advance confined to living costs, but, according to latest reports, lubricating oils throughout the republic have been raised 20 centavos. First in protesting the rise, as made by the official Mexican Petroleum, have been thousands of taxi operators within the federal district.

A. P. I. Annual Meeting

Discontented independents keep directors in session long hours . . . Officers are re-elected Mid-year meeting will be held at New Orleans

Best evidence that cross currents of discontent were blowing during the four days of the nineteenth annual meeting of the American Petroleum Institute in Chicago last week can be had from the fact that 81 members of the board of directors were present for its first session. This was the largest attendance ever recorded for a broad meeting, which lasted four hours.

Chief reason for this attendance was that independent oil producers through both organizations and individually had a series of proposals and suggestions which added up to a plea that the industry change some practices or producers would take their troubles to government.

Through four days the industry looked at itself and listened to what others thought. The Institute itself came out of the meeting with an enlarged executive committee and a smaller board of directors. The move to create a Division of Public Relations moved along to the point of getting before the executive committee.

Axtell J. Byles, Institute president, made a plea in behalf of clinging to what is right in the industry along with condemning what is wrong.

Donald R. Richberg outlined his theory that American industry preserve its rights by fashioning an economic constitution, just as the founders of the republic assured personal liberty through a political constitution.

J. Howard Pew held out for continuance of the system of free enterprise in American business.

General Hugh S. Johnson told the members that he believed there would be further effort to bring federal control into business, but added that he thought industry had sufficient power to halt it.

New Orleans was selected for the 1939 mid-year meeting. Dates will be announced later. The next annual meeting will be held in Chicago, November 13, 14, 15, 16 and 17.

Johnson Final Speaker

General Johnson was the final speaker at the last general session Thursday afternoon. Concerning the relations between business and government he said:

"Government is bound to have an increasing contact with business. The people, through government, are sure to exercise a greater control over the policies of business. Business, especially big business, should recognize that and should welcome it.

"Our need is not for government to fight business or business to fight government—not for government to run business or business to run government. It is only for business and government to pull together and cure the ills of this country and to defend it from all enemies. That need was never greater than it is right now."

In his speech, "The Oil Industry, a Living Monument to the American System of Free Enterprise," J. Howard Pew, president, Sun Oil Company, Philadelphia, declared that the oil industry charges lowest prices for its merchandise, pays highest wages, increases employment even in depression periods, and earns less on its capital than is earned on government bonds. He characterized this record as proving the contrary of monopoly. He added:

"The stigmas of monopoly just are not there."

In other industries as well as petroleum, he cited the existence of small concerns as well as large ones and said:

"My own feeling is that if the great concerns can operate in the general interest, within our free enterprise system, then they should not be molested merely because of their size. But I strongly feel that we must foster the smaller units and give them such encouragement that they will always be part of our system. The small units of today will be the big units of tomorrow. Through them industry and enterprise must receive constant infusion of new blood, new talent, new energy, and ever-widening outlook. We must have the smaller units as well as the larger, complementing each other and together giving us a properly rounded and coordinated business structure. The discouragement of small business would shortly precipitate conditions in which all enterprise would be smothered."

His opinion concerning the attitude of government toward business was:

"It is proper for government to lay down general rules to preserve competition to prevent monopoly, to enforce sound business ethics. Having laid them down, government should enforce them. But when the arm of government is thrust into the intimate workings of business, when government undertakes to dictate policy, to fix prices, to interfere with the very competition which it assumes to be protecting, then we have government control: and that is inevitably paralyzing to initiative, invention, adventure and enterprise."

His conclusion was an appeal as follows:

"I appeal to you men of this great industry to stand firm in defense of the American system of free and competitive enterprise. The truth is that no economic planning authority could ever have foreseen, planned, plotted or organized such an amazing spectacle of industrial progress as the world has witnessed in the last century. It could have been achieved only under conditions of wide open invitation to all the genius, inventive ability, organizing capacity, and managerial skill."

An attitude similar to that of Mr. Pew ran through the remarks of Donald R. Richberg, Washington attorney and former director of the National Industrial Recovery Act, whose first statement was to the effect that the fallacy of government's laying down a pattern for business had been proved by NRA.

Richberg, however, restated his advice that business write in effect an economic constitution. His words on this were:

"Our forefathers found a way out of political chaos when conflicts of economic and sectional interest threatened to prevent effective self government and to deny them the blessings of a hard-won liberty. They wrote a political constitution in which they preserved the reality of state sovereignty by delegating some governing powers to a federal authority and they preserved the reality of personal liberty by subordinating some exercise of individual freedom to obligations to the general welfare.

"The first step in this practical program was to write a political constitution creating an effective machinery of self government and establishing definite areas of majority powers and minority rights, definite areas of public responsibility and private freedom.

"The demonstrated wisdom of this program might well guide us in seeking a way out of economic turmoils. Our economic system is still a loose federation of separate trades and industries that might be regarded as economic states, all anxious to preserve self government and individual liberty. But how can the petroleum industry, for instance, solve its perplexities until it is able to write an economic constitution for the industry, creating a workable machinery of self discipline and establishing sound principles for the determination of rights and obligations.

"Then looking ahead, just as our national political constitution maintained the pattern and strengthened the authority of state constitutions, so we may eventually write a national economic constitution to harmonize our national economy, which would follow the pattern and strengthen the authority of the economic constitutions of our major trades and industries."

Byles Offers Advice

The annual address of Axtell J. Byles, Institute president, heard at the first general session Wednesday afternoon, was in part a review of the year in petroleum circles. His recommendations for the future were that the Connally Act be renewed, that the Interstate Oil Compact be renewed, and that states not now members of the compact be induced to join. On this last point he said:

"The commission will be seriously handicapped, however, unless it has full and complete cooperation of all oil producing states, particularly Illinois, Michigan, Arkansas, Louisiana and California."

Turmoil within the industry because of recent price reductions, with consequence threats of federal regulation from both state officials and oil producers drew this:

"These particular times and circumstances give birth to many ideas and suggestions. Might it now be well to remember that the instructions of experience are far safer guides than dec-

larations of abstract idealism; that small initial variations from sound principles often lead to astonishingly different ultimate results than those anticipated. Without intending to be critical of any one, it may not be improper to cite an old expression, namely, that those who indulge in wild notions often fly high and light low. The whole point I am trying to make is that the easy way is often the wrong way and that sometimes the prescription harms the patient more than it could possibly help him. In connection with the study of various proposals it may not be amiss for us to pause and view what is right with the oil industry while we are considering what is wrong with it."

Institute elects officers, enlarges executive committee

Axtell J. Byles, of New York, was re-elected president of the American Petroleum Institute. The board of directors, convening at the Institute's 19th annual meeting at Chicago, also elected other officers for the coming year, enlarged the membership of the executive committee to 19 from 12, and adopted changes in the by-laws of the organization. The office of vice president at large was eliminated, membership of the board changed to 100 from the present 107, board meetings placed upon a semi-annual basis, and the executive committee called upon for 10 monthly meetings each year.

The new officers are: President, Axtell J. Byles, of New York; Vice President for Production, George A. Hill, Jr., Houston Oil Company of Texas, Houston, a re-election; Vice President for Refining, J. Howard Pew, Sun Oil Company, Philadelphia, to succeed W. S. S. Rodgers, The Texas Company, New York; Vice President for Marketing, Eric Weber, Eureka Oil Company, Cincinnati, to succeed C. E. Arnott, of Socony-Vacuum Oil Company, Inc., New York; Executive Vice President, W. R. Boyd, Jr., of New York, a re-election; Treasurer, Otto Donnell, The Ohio Oil Company, Findlay, Ohio; a re-election; Secretary and Assistant Treasurer, Lacey Walker, of New York, a re-election; and Assistant Secretary, John S. Cooke, of New York, a re-election.

Members of the new and enlarged executive committee, also elected by the board, are: F. A. Leovy, Gulf Oil Corporation, Pittsburgh; Charles F. Roeser, Roeser & Pendleton, Fort Worth; John A. Brown, Socony-Vacuum Oil Company, New York; B. L. Majewski, Deep Rock Oil Corporation, Chicago; W. A. Jones, Cities Service Company, New York; R. G. A. van der Woude, Shell Union Oil Corporation, New York; H. F. Sinclair, Consolidated Oil Corporation, New York; J. D. Collett, O'Keefe & Collett, Fort Worth; W. S. S. Rodgers, The Texas Company, New York; E. G. Seubert, Standard Oil Company (Indiana), Chicago; W. S. Farish, Standard Oil Company of New Jersey, New York; C. M. Boggs, The Kanotex Refining Company, Arkansas City, Kansas; W. H. Berg, Standard Oil Company of California, San Francisco; W. F. Humphrey, Tide Water Associated Oil Company, San Francisco; J. L. Hamon, Cox & Hamon, Dallas; W. G. Skelly, Skelly Oil Company, Tulsa; Robert H. Colley, The Atlantic Refining Company, Philadelphia; Frank Phillips, Phillips Petroleum Company, Bartlesville, Oklahoma; and H. M. Dawes, The Pure Oil Company, Chicago.

The board re-elected D. E. Buchanan, of Hanlon-Buchanan, Inc., Tulsa, Oklahoma, as chairman of the membership committee.

American Petroleum Industries Committee

The membership of the American Petroleum Industries Committee was increased by one with the election of C. C. Herndon, Skelly Oil Company, Tulsa. The entire membership was re-elected, as follows: Harry T. Klein, The Texas Company, New York; E. S. Hall, Standard Oil Company of New Jersey, New York; J. J. Cosgrove, Continental Oil Company, Ponca City, Oklahoma; Paul M. Gregg, Union Oil Company of California, Los Angeles; W. J. Guthrie, Gulf Refining Company, Pittsburgh; G. V. Holton, Socony-Vacuum Oil Company, New York; W. A. McAfee, Standard Oil Company of Ohio, Cleveland; and Roy T. Osborn, Sinclair Refining Company, New York.

Changes in the by-laws designed to make them more flexible and better adapted to present needs of the Institute were recommended by a committee on by-laws, of which J. Edgar Pew, Sun Oil Company, Philadelphia, was chairman, and were adopted by the board. The changes include provision for "honorary" and "active" members of the Institute; special meetings to be held at the call of the board of directors of the executive committee; directors to be elected from membership, and company representation limited to three; membership of board changed to 100 from the present 107; 25 directors to be elected by the board itself; meetings of board to be held semi-annually and meetings of the executive committee to be held monthly except in July and August; increasing the membership of the executive committee to 19; and eliminating the office of vice president at large, last held by the late K. R. Kingsbury, Standard Oil Company of California.

Division of Production

Membership of the General Committee for the Division of Production were selected as follows:

Members elected by the Division: L. E. Barrows, The Texas Company, Houston; J. E. Brantly, Drilling & Development Company, Inc., Los Angeles; M. E. Brock, Gulf Oil Corporation, Houston; C. Bunje, Jr., Illinois Pipe Line Company, Findlay; W. L. Connelly, Sinclair Prairie Oil Company, Tulsa; C. P. Dimit, Phillips Petroleum Company, Bartlesville; J. G. Dyer, Continental Oil Company, Ponca City; A. J. Galloway, Shell Petroleum Corporation, St. Louis; W. E. Gilbert, Shell Oil Company, Los Angeles; R. B. Kelly, The Pure Oil Company, Fort Worth; M. J. Kirwan, Indian Territory, Illuminating Oil Company, Bartlesville; M. E. Lombardi, Standard Oil Company of California, San Francisco; C. V. Millikan, Amerada Petroleum Corporation, Tulsa; W. M. O'Connor, The Atlantic Refining Company, Philadelphia; B. E. Parsons, General Petroleum Corporation, Los Angeles; F. O. Prior, Stanolind Oil & Gas Company, Tulsa; Dewitt T. Ring, Ohio Fuel Gas Company, Columbus; A. C. Rubel, Union Oil Company, Los Angeles; E. H. Salrin, Tide Water Associated Oil Company, Houston; John R. Suman, Humble Oil & Refining Company, Houston.

Appointed to the committee by the president of the institute are: O. D. Donnell, Ohio Oil Company, Findlay; C. H. Kountz, Sinclair Refining Company, Independence; R. B. Lloyd, Lloyd Oil Corporation, Ltd., Los Angeles; John M. Lovejoy, Seaboard Oil Corporation, New York and J. Edgar Pew, Sun Oil Company, Philadelphia.

Fifty-five directors elected by Institute

Members of the American Petroleum Institute and of its Board of Directors on November 16 elected 54 directors to serve two year terms and one director to fill an unexpired term. Directors-at-large were elected by the board itself, while other directors were elected by members of the Institute at the afternoon general session.

Discussion of the economic situation before the petroleum industry was continued before the Board of Directors session Wednesday morning. Those heard were: Charles F. Roeser, W. S. Farish, Burdette Blue, E. B. Reeser, C. A. Lester, J. A. Vickers, B. L. Majewski, George A. Hill, Jr., O. D. Donnell, A. V. Bourque, Ralph Lloyd and Wirt Franklin.

The following directors were elected by members of the Institute:

Production Group

Pacific Coast: Dana Hogan, of Hogan Petroleum Co., Los Angeles, Calif., to succeed W. H. Berg, of Standard Oil Co. of California, San Francisco, Calif., who was transferred to the Distribution Group; R. A. Broomfield, Barnsdall Oil Co., Los Angeles; L. P. St. Clair, Union Oil Co. of California, Los Angeles.

Central U. S.: Amon G. Carter, Star-Telegram, Fort Worth, Texas; E. A. Landreth, Landreth Production Corp., Fort Worth; E. H. Moore, Tulsa, Okla.; Ralph Pryor, Pryor & Lockhart, Wichita, Kas.; J. A. Vickers, The Vickers Petroleum Co., Wichita.

Eastern U. S.: E. L. Shea, Tide Water Associated Oil Co., New York, N.Y.

Manufacturing Group

Pacific Coast: C. E. Olmstead, The Texas Co., Los Angeles.

Central U. S.: C. M. Boggs, The Kanotex Refining Co., Arkansas City, Kas.; Roy B. Jones, Panhandle Producing & Refining Co., Wichita Falls, Tex.

Eastern U. S.: W. V. Harmann, Gulf Refining Co., Pittsburgh, Pa.; Harry A. Logan, United Refining Co., Warren, Pa.; W. E. Smith, Standard Oil Co. (Kentucky), Louisville, Ky.

Distribution Group

Pacific Coast: W. H. Berg to succeed the late K. R. Kingsbury, whose term expired.

Central U. S.: H. M. Dawes, The Pure Oil Co., Chicago; L. L. Marcell, Socony-Vacuum Oil Co., Inc., Kansas City, Mo.

Eastern U. S.: E. W. Sinclair, Consolidated Oil Corp., New York.

Transportation Group

Pipe Lines: C. H. Kountz, Sinclair Prairie Pipe Line Co., Independence, Kas.

Ships: J. Howard Pew, Sun Oil Co., Philadelphia, Pa.

Foreign Trade Group

Europe: W. C. Teagle, Standard Oil Co. of New Jersey, New York.

Supply Group

J. L. Shakely, Frick-Reid Supply Co., Tulsa, to succeed W. J. Morris; E. S. Dulin, Byron Jackson Co., Los Angeles, to succeed W. M. Patterson.

Natural Gas

J. D. Creveling, Panhandle Eastern Pipe Line Co., New York.

Natural Gasoline

W. K. Warren, Warren Petroleum Corp., Tulsa.

At-Large Group

C. J. Barkdull, Standard Oil Co. (Indiana), Chicago, to succeed E. J. Bullock; Jacob France, Mid-Continent Petroleum Corp., Tulsa; Wirt Franklin, Wirt Franklin Petroleum Corp., Ardmore, Okla.; S. A. Guiberson, Jr., Guiberson Oil Co., Dallas, Texas; W. F. Humphrey, Tide Water Associated Oil Co., San Francisco; D. J. Moran, Continental Oil Co., New York; T. Rieber, The Texas Co., New York; W. G. Skelly, Skelly Oil Co., Tulsa; R. W. Stewart, Chicago; and K. W. Adams, Phillips Petroleum Co., Bartlesville, Okla., to fill the unexpired term of the late F. R. Coates.

The board of directors reelected the following members of the At-Large Group: T. H. Barton, Lion Oil Refining Co., El Dorado, Ark.; Amos L. Beaty, New York; E. R. Brown, Magnolia Petroleum Co., Dallas; J. A. Brown, Socony-Vacuum Oil Co., Inc., New York; P. H. Curry, South Penn Oil Co., Pittsburgh; W. S. Farish, Standard Oil Co. of New Jersey, New York; Harry Frueauff, Cities Service Co., New York; H. R. Gallagher Consolidated Oil Corp., New York; B. F. Harris, National Tube Co., Pittsburgh; E. J. Henry, The Atlantic Refining Co., Philadelphia, Pa.; George A. Hill, Jr., Houston Oil Co. of Texas, Houston; H. L. Hunt, H. L. Hunt, Inc., Tyler, Texas; R. B. Lloyd, Lloyd Corp., Ltd., Los Angeles; John M. Lovejoy, Seaboard Oil Corp. of Delaware, New York; N. C. McGowen, United Gas Public Service Co., Houston; I. A. O'Shaughnessy, Globe Oil and Refining Co., Minneapolis; R. G. A. van der Woude, Shell Union Oil Corp., New York; Earle W. Webb, Ethyl Gasoline Corp., New York; and R. L. Wheelock, Wheelock & Collins, Corsicana, Texas.

Advances in production practices are announced

Oil well drilling and production practices have changed in the last 15 years from jobs depending upon the strength of equipment and the personal capabilities of men involved to exact and controlled operations employing sciences and accurate measuring and control devices, American Petroleum Institute members and visitors were told during the past week at the various production sessions.

A strong array of papers was presented before several meetings, and important advances in drilling and production practices were announced. New methods in research affecting the discovery, production, and transportation of oil reflected progress of the past year. More advanced data on theories held questionable a few years ago were offered by several authors.

A comparison of methods of today with those of 15 years ago reveals the progress made in all branches of the industry. Exactness and science have replaced the old hit-or-miss practices formerly employed in shallow drilling and producing operations.

Abstracts of papers delivered before sessions of the Division of Production follow:

The Suitability of Several Casing Steels for Field Welding

By L. R. HODELL
The Carter Oil Company

Approximately 200 joints of casing representing six different steels have been welded under field conditions, and quenched at varying intervals after breaking of arc. Results indicate that the various steels respond differently to the quenching. As a result of comparing manners in which they respond with the exigencies of field practices, certain of these steels are considered weldable and certain others are not weldable when used in the field welding of casing. In order to establish a standard, a test procedure has been proposed for the purpose of determining the field weldability of various casing steels.

Evaporation Losses of Petroleum Oils from Steel Tanks

By C. C. ASHLEY
Shell Oil Company

The study upon which this report is based was undertaken in an effort to correlate and compare all available data on tank evaporation losses so that charts might be prepared to assist in the prediction of evaporation losses occurring in petroleum oils while standing in storage and while being pumped into tanks.

A detailed review of a large amount of data on evaporation losses indicates that much of the information published as comparable is not comparable, because there has been no common basis for comparison. Methods of presentation used have not included enough of the many variables affecting evaporation losses to insure results truly representative or comparable. The charts presented are based on a factor believed to be the most comprehensive of any so far used in this work, and upon which adequate correlation of tests made under widely variable conditions can be accomplished. This factor is "vapor pressure of oil at average temperature of oil in tank."

Two charts, which can be used as the prediction of losses, are presented: "evaporation loss of petroleum oils from standing storage in steel tanks," and "evaporation loss of petroleum oils due to pumping into steel tanks." The data upon which these charts have been prepared are rather meagre, and the charts, consequently, are subject to revision as additional information becomes available.

Incidental to the preparation of the charts, it has become evident that there is a real need for a uniform procedure for conducting evaporation-loss tests, which can be adopted generally, and which will facilitate coordination of results secured by different investigators. A suggested procedure is presented in the appendix to this report.

The Calculation of Venting Requirements for Low-Pressure Oil Storage Tanks

By LOUIS BOSA
Shand and Jurs Company

Oil storage tanks "breathe" on account of temperature variations or during filling and emptying operations. Breather valves allow a tank to breathe while limiting at the same time the evaporation losses. The size and number of breather valves required in a certain installation depend upon the maximum probable breather rate, in cubic feet per hour.

An investigation of the methods used for the calculation of venting requirements has led the author to submit a "standard method of calculation," flexible enough to fit varying conditions, and insuring at the same time the necessary degree of safety. A nomographis chart is appended to simplify the numerical computations.

This paper discusses the present methods for the calculation of venting requirements; proposed standard method for the calculation of venting requirements; selection of venting equipment; examples of applications of the proposed standard method; breather—flame arrester units; vapor efflux due to boiling; emergency venting; thermal breathing; pressure thermal breathing; thermal vacuum breathing; pumping-in breathing; and the total breathing required capacity required, respectively, on the pressure and vacuum sides as calculated by formulas.

It has become rather general practice in the petroleum industry to use gas-tight tanks for the storage of the more volatile crude and refined products. Manufacturers of venting equipment furnish capacity curves for their valves, from which a user can select the number and size of valves required for a given installation—provided he can determine the volumetric breathing requirement for that installation.

Operating Costs of Multi-Cylinder Gas Engines

By JAMES McNEIL
Union Oil Company

Multi-cylinder gas engines are used extensively in California for oil well pumping. The cost of operating and maintaining engines in pumping service as experienced by a California company is presented. Operating costs are shown for the various size engines, and factors influencing them discussed briefly. The importance of a competent maintenance personnel is stressed in this article.

At the present time about 2500 multi-cylinder gas engines are used for pumping in California fields. In 1932 the number was less than 50. This type of engine was first used in the state for this purpose about 1930. At that time small operators began to use old automobile engines on their wells. Such engines proved to be surprisingly dependable and economical to operate, and in 1932 the industrial engine manufacturer entered the field.

The rapid increase in use of engines of this type has been due both to the low first cost and operating economy of multi-cylinder gas engines, and to development of individually-powered portable pulling equipment that permits the use of the lower-powered engines for straight pumping services.

Engines now used are of several types and sizes, the displacement rang-

ing from 100 to 800 cubic inches, and the cylinder range running from four to eight. Loads are as low as five horsepower and as high as 75 horsepower. The four-cylinder, 250- to 400-cubic inch engines predominate, but the present trend is toward the six-cylinder model because of the wider speed range and higher horsepower output per cubic inch of displacement.

Various charts are shown on operating costs.

Solubility Relations and Volumetric Behavior of Three Gravities of Crudes and Associated Gases

By J. E. GOSLINE and C. R. DODSON
Standard Oil Company of California

Solubility relations and volumetric behavior of three gravities of crudes and associated gases were experimentally determined. The measurements were made from a series of pressures, temperatures, and gas-oil ratios. To illustrate the nature of influence of residual crude gravity upon certain of the more commonly used engineering factors, several correlations are indicated. Values of formation volume are tabulated, and factors for converting formation volume into specific volume are included.

A knowledge of the physical properties of reservoir fluids is fundamental to a rational treatment of many problems in production engineering. Unfortunately the behavior of naturally occurring hydrocarbon systems is extremely complex, and up to the present time not generally predictable from a knowledge of the composition of the system.

In this paper are presented the results obtained from three mixtures from flowing wells producing from a sand of upper Miocene age in the San Joaquin Valley. Of the many possible correlations on an oil-gravity basis, only a sufficient number are presented to indicate the trend of certain of the most commonly used factors. The absolute factors must be used with caution for crudes and gases of the same gravity, because total composition has a material influence upon the behavior of the material. The nature of the dependency of certain of the factors upon gravity is believed to be of interest, and perhaps of some quantitative utility to those desiring to estimate factors for conditions in a particular field on the basis of a restricted number of actual determinations.

Nature and Importance of Surface Forces in Production of Petroleum

By FRANK C. BENNER, WESLEY W. RICHES, and F. E. BARTELL
University of Michigan

The nature and importance of the surface forces active in reservoirs in which the pore sizes fall within range of capillary dimensions are discussed. In reservoirs where the area to volume ratio is relatively great, surface forces become a factor of considerable magnitude in the production of oil. The fundamental concepts of surface forces are reviewed with particular reference to systems in which crude oil is one of the phases present. Problems of interest to petroleum technologists are of two types: those concerning the static condition of virgin reservoirs, and those involving the dynamic relationships in flowing wells. Particular emphasis is placed on the role of surface forces in the effective utilization of advancing edge water. The optimum rate of water advance into oil-bearing sands is a function of many factors. The rate at which water can strip oil from the sand is one of the most important, and is related directly to the surface properties of oil, water and sand. Trapping oil by by-passing is considered. The phenomenon of "counterflow" in capillaries of different sizes is discussed from a theoretical viewpoint. Experimental studies on this phenomenon are also presented. It is shown that the proper balance between surface forces and the other active forces in the reservoir is a deciding factor in controlling rates of production for optimum recovery.

Sub-surface Sampling

By D. L. KATZ
University of Michigan

This paper is an abstract of the Report of the Subcommittee on Fundamentals of Obtaining, Transporting, and Analyzing Sub-surface Samples of Crude Oil prepared for the Topical Committee on Production Technology. It discusses the fundamental principles underlying the behavior of complex hydrocarbon systems for the purpose of providing a basis for critical review of the methods of obtaining, transporting, and analyzing sub-surface samples of crude oil. Recommended terminology and methods of reporting data on sub-surface samples are included.

The greatest contribution that sub-surface sample work has made to the production industry is the development of our concepts of the behavior of oil and gas in the reservoir. Not until sub-surface samples were obtained did we have a clear idea of the phase relations in the sand—which is necessary in order to make intelligent decisions on many daily production problems.

Better identification of horizons is permitted by combined use of equilibrium data and sub-surface sample analyses. Because of the high concentration of the more volatile constituents in high-bubble-point pressure samples, an added criterion for identifying a reservoir liquid is available. Sub-surface sample analyses and equilibrium data assist in identifying gas zones as being the equilibrium phase for a reservoir oil or not of the proper composition to be the equilibrium phase.

The Care and Maintenance of Instruments Used on Drilling Rigs

By E. L. DECKER
Martin-Decker Corporation
and N. L. DORN,
Lane-Wells Company

Advances in rotary-drilling technique have found the crews unprepared to handle the instruments necessary to this progress. Carelessness, negligence, and abuse still occur. The need is shown for care and maintenance routines, and the benefits from such programs are brought out by reports from operators. Fixed responsibility, instruction of crews, and steps to minimize the occurrence and effects of abuse are recommended.

From the reports, the authors observe a decided variance in the methods of caring for instruments used on drilling rigs. From the writers' observance, it appears that those operators who have become instrument-conscious exert more or less effort toward a systematic routine of instrument care. The lack of attention on the part of many operators probably is due to the fact that, as compared to the total cost of a well, instrument maintenance is but a small item. On the other hand, if these operators would realize that the unseen cost of instrument failure is not a negligent item in the total cost of a well, they soon would establish some systematic maintenance routine.

Such a maintenance system need not be unduly complicated or involve red tape. The essentials of a good maintenance are few and simple;

First: Instruct the crews. Vocational training along the lines of the Institute's program would be useful here.

Second: Fix the responsibility; everybody's job is nobody's job.

Factors Influencing the Application of Pumping Units

By EMORY KEMLER
Gulf Oil Corporation

The application of pumping units on the basis of peak-torque requirements is the most satisfactory method available to date. Actual well tests concluded show that the use of maximum well load for figuring peak torque does not give representative results at higher speeds. The theoretical investigation of the effect of prime mover on peak torque shows that the engine coefficient of fluctuation should be the basis for correcting horsepower ratings, rather than the number of expolsions per minute.

The A.P.I. specifications state that the rating of gear units applies only when there is an absence of torsional vibrations. This paper gives a theoretical investigation of the problem, and shows that torsional vibrations can exist in the geared system as used on pumping units. Experimental data given show that, when rotary counterbalance is used, these critical speeds or torsional vibrations can exist.

Besides the fact that gear units should be applied on the basis of peak torque, the data and theory presented in the paper show that the engine-drive service factors, as included in Table 3 and Figure 1 of A.P.I. Standards No. 11-E, are not correct, and result in excessive penalties to properly equipped single cylinder engines. It is also concluded that the use of maximum load in figuring peak torque will give units larger than necessary, if based on calculated loads at high speeds. At normal speeds the agreement is believed reasonable.

The Use of Rust-Hole Records to Study Pipe Service

By WALTER F. ROGERS
Gulf Oil Corporation

It has been found that a relationship exists for pipe lines between the cumulative number of rust holes and time. The relation is expressed by the exponential equation $R=bT^n$. Pipe lines of short length may have two or more values of n during the first 10 to 15 years of their history. The longer the pipe line, the fewer are the values of n. The value of reconditioning to a pipe line may be determined by plotting the relation of cumulative rust holes vs. time for the line. It is shown for the pipe lines studied that "hot-spot" reconditioning is more economical than "long-line" reconditioning. The cumulative rust-hole—vs.-time curves for 6-inch and 8-inch pipe with a minimum age of 15 years is used to calculate the value of pipe-wall thickness in governing the occurrence of rust holes. The data show that pipe weight should be governed entirely by the pressure to be used, and no wall thickness should be added for soil-corrosion attack. Soil corrosion best can be taken care of by pipe coating and cathodic protection.

The Houston Pipe Line Division of the Gulf Refining Company has approximately 4000 miles of pipe line ranging in diameter from 4 inches to 12 inches. With but few exceptions this system consists of pipe laid without any coating to protect the metal from soil attack. The ages of these lines vary widely. The first line was laid on the Texas Gulf Coast in 1903, and this was followed in 1907 by a line laid from the Gulf Coast to Oklahoma. Some new

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pipe line has been added almost every year since these dates. The factors that the pipe-line system consists of many miles of pipe, and the pipe was laid uncoated, and that it has a history extending back 35 years, make the corrosion experience of these lines an excellent material source from which to study the problem of soil corrosion.

Report on API Pump-Performance Experiment

By M. G. ARTHUR and E. K. PARKS
Standard Oil Company (California)

This paper describes the procedure and results of an American Petroleum Institute cooperative experiment on reciprocating pump performance, conducted in an effort to show the influence on liquid pumped on such factors as: 1. fluid head on the standing valve; 2. viscosity; 3. velocity through the standing valve; and 4. size of standing valve opening, and size and length of any tubes leading to the standing valve.

It is stated that results of the test indicate that no serious loss of efficiency should be found in practice unless the proportions of sound design are disregarded, such as attempting to pump very viscous liquid at high speed with low fluid head.

Fluid head provides the force to overcome the fluid friction set up by various combinations of the other three factors. Hence, the countless number of combinations of these four factors found in practice result in the wide divergence of pump outputs obtained.

The Value of Soil-Survey Methods

By J. M. PEARSON
Sun Pipe Line Company

The paper summarizes the type of information upon which modern soil-corrosion tests are made. From this background two approaches are open to the corrosion technologist. He may: 1. Examine data on corrosion experience to deduce certain constants to define soil corrosiveness; or, 2. He may correlate these constants (corrosivity) with soil measurements made in the field.

Having established those criteria most suitable to the corrosion survey required, a method is described that will evaluate the survey in terms of operating costs and investment charges.

The work of many investigators is discussed in the hope that corrosion technologists will become interested in making quantitative measurements of the effects of corrosion in different soils. How this may be done is indicated.

Some of the pitfalls awaiting unwary users of statistical formulas are noted, and a method by means of which extrapolations can be criticized is given.

Institute presents 76 safety awards

A total of 76 accident-prevention certificates signalizing establishment of low accident-frequency, accident-severity and injury-index records were presented at the general session of the American Petroleum Institute at Chicago, November 16.

Safe operation of its Whiting, Indiana, refinery for 11,274,866 hours brought a special certificate to Standard Oil Company (Indiana), increasing to 17 the number of Institute Safety awards won by this department, which has established five 1,000,000-hour records since January 1, 1937.

Institute accident-prevention certificates were awarded to the following:

All Department Award: Continental Oil Co., Ponca City, Okla., 6,339 workers with only 4.27 disabling injuries per 1,000,000 hours worked and only 1.48 days lost per 1,000 hours worked; Union Oil Co. of California, Los Angeles, Calif.; and Pan American Petroleum & Transport Co., New York, N. Y.

Refining: Continental Oil Co., Ponca City, Okla.; Humble Oil & Refining Co., Houston, Texas; Colonial Beacon Oil Co., Boston, Mass.; American Petroleum Co., Houston; and Pan American Southern Corp., New York.

Wholesale Marketing: Continental Oil Co., Ponca City; Standard Oil Co. of Nebraska, Omaha, Neb.; and Panhandle Refining Co., Wichita Falls, Texas.

Retail Marketing: Charleston Oil Co., Charleston, S. C.; Union Oil Co. of California, Los Angeles, Calif.; Wadhams Oil Co., Milwaukee, Wis.; and Standard Oil Co. of Nebraska, Omaha.

Wholesale and Retail Marketing: Standard Oil Co. (Indiana), Chicago; Magnolia Petroleum Co., Dallas, Texas; and White Star Northern Oil Co., Detroit, Mich.

Drilling

Drilling: The Ohio Oil Co., Findlay, Ohio; Standard Oil Co. of California, San Francisco, Calif; and Kendall Refining Co., Bradford, Pa.

Production: Continental Oil Co., Ponca City; General Petroleum Corp. of California, Los Angeles; Tide Water Associated Oil Co., New York; Hope Construction and Refining Co., Pittsburgh, Pa.; Republic Production Co., Houston; and Wirt Franklin Petroleum Corp., Oklahoma City, Okla.

Natural Gasoline: Warren Petroleum Corp., Tulsa, Okla.; and Standard Oil Co. of Louisiana, Baton Rouge, La.

Oil Pipe Line: Stanolind Pipe Line Co., Tulsa; The Atlantic Refining Co., Philadelphia, Pa.; Skelly Oil Co., Tulsa; and Barnsdall Oil Co., Tulsa.

Gas Pipe Line: The Peoples & Columbia Natural Gas Companies, Pittsburgh.

Marine: The Texas Co., New York; Tide Water Associated Oil Co., San Francisco; The Pure Oil Co., Chicago; and Pan American Southern Corp., New York.

Institute accident-prevention certificates for 1,000,000-hour and five-year records were awarded to the following various departments:

Standard Oil Co. (Indiana), Chicago, Whiting refinery, total of 11,274,866 hours; Standard Oil Co. (Indiana), Mechanical Department of Whiting refinery, 3,312,824 hours; Standard Oil Co. (Indiana), Neodesha refinery, 2,271,754 hours; Standard Oil Co. (Ohio), No. 2 refinery, Cleveland, Ohio, 2,016,098 hours; Standard Oil Co. of New Jersey, Administration Department, Bayonne, N. J., refinery, 1,987,200 hours; Standard Oil Co. (Indiana), Heavy Oils Department of Whiting refinery, 1,668,356 hours; Standard Oil Co. of New Jersey, Oil Movement and Storage Department, Bayway, N. J., refinery, 1,654,448 hours.

Shell Oil Co., Martinez, Calif., refinery, 1,457,299 hours; Standard Oil Co. of Louisiana, Baton Rouge, La., Development and Research Division, 1,439,500 hours; Continental Oil Co., Ponca City, Okla., Refining Department, 1,375,931 hours; Shell Oil Co., Distilling Department, Martinez refinery, 1,369,356 hours; Standard Oil Co. (Indiana), Wood River refinery, 1,324,221 hours; Standard Oil Co. of New Jersey, Bayonne, N. J., refinery, 1,321,992 hours; Standard Oil Co. (Indiana), Casper, Wyo., refinery, 1,318,426 hours; Standard Oil Co. of Louisiana, Utility Division, 1,217,800 hours; Standard Oil Co. (Indiana), Mechanical Division, Neodesha refinery, 1,209,124 hours.

Shell Oil Co., Martinez refinery, Engineering Department, 1,188,185 hours; Humble Oil & Refining Co., Cracking Coil Department of Baytown, Texas, refinery, 1,153,823 hours; The Atlantic Refining Co., Gas, Acid and Drainage Department, Point Breeze, Pa., refinery, 1,079,772 hours; and The Atlantic Refining Co., Refining Division, Point Breeze refinery, 1,009,183 hours.

Institute accident-prevention certificates for 1,000,000-hour and five-year records were awarded to the following Marketing Departments:

Continental Oil Co., 2,960,497 hours; Standard Oil Co. (Indiana), Mason City, Iowa, Sales Division, 2,597,852 hours; General Petroleum Corp. of California, Washington Division, Seattle, Wash., 2,359,470 hours; Standard Oil Co. (Indiana), Wichita, Kans., Sales Division, 2,214,062 hours; Standard Oil Co. (Indiana), La Crosse, Wis., Sales Division, 1,662,444 hours; Standard Oil Co. (Indiana), Duluth, Minn., Sales Division, 1,397,280 hours; and Magnolia Petroleum Co., Little Rock, Ark., District, 1,245,291 hours.

Standard Oil Co. (Indiana), Quincy, Ill., Sales Division, 1,240,072 hours; Standard Oil Co. (Indiana), Green Bay, Wis., Sales Division, 1,202,371 hours; Standard Oil Co. (Indiana), Kansas Wis., Sales Division, 1,202,371 hours; Standard Oil Co. (Indiana), Kansas City, Mo., Sales Division, 1,169,388 hours; Standard Oil Co. (Indiana), Minneapolis, Minn., Sales Division, 1,142,739 hours; and The Atlantic Refining Co., Philadelphia District, 1,003,800 hours.

A certificate was presented also to the Drilling Department of Republic Production Co., Houston, Texas, for the best known record of a drilling department, 288,521 hours.

Gillies is chosen as new AIMME head

Donald B. Gillies, vice-president of the Republic Steel Corporation of Cleveland, Ohio, was elected president of the American Institute of Mining and Metallurgical Engineers, by letter ballot of the members as reported by the tellers, at the meeting of the board of directors held last week in New York.

A. B. Parsons, secretary of the Institute, announced the election of the following new directors: Charles Camsell, Deputy Minister, Department of Mines & Resources of the Dominion of Canada, of Ottawa; Chester A. Fulton, president of the Southern Phosphate Corporation, of Baltimore; James T. MacKenzie, chairman, Iron and Steel Division, A.I.M.E., and Metallurgist and Chief Chemist, American Cast Iron Pipe Company, Birmingham, Alabama; and Francis A. Thomson, chairman, Mineral Industry Education Division, A.I.M.E., and president of the Montana School of Mines, of Butte, Montana.

Market Situation

Both crude and refined markets are steady as production holds to levels that permit a continued withdrawal of stock . . . Prices firm

Markets generally steady as conditions are good

The market outlook remains favorable, as conditions in the industry are satisfactory, while the general business situation continues to improve.

Giving encouragement is the prospect that crude oil production control will be strict again in December. The Texas Railroad Commission has indicated that it probably will extend Saturday and Sunday shutdowns of Texas fields through December. Such action very likely would induce other leading producing states to cooperate with similarly strict control.

Conditions Good

The statistics of the industry which became available in the past week showed a continuation of satisfactory operating conditions, in the fields and at the refineries.

Crude oil production was sharply down, following the restoration of Saturday and Sunday shut-downs, which had been lifted in the final week of October.

Crude oil runs to refinery stills were a little higher than in the previous week but they still were well below the corresponding level last year.

Crude Stocks Low

Oil inventories are generally satisfactory. Crude stocks are still around the 16-year low level. Gasoline stocks were contra-seasonally lowered in the week ended November 12, and were at approximately the same level as a year before. Fuel oil stocks are about 28 percent larger than a year ago, but consumption of furnace oil is materially higher than last year.

Crude Market Steady

The markets for crude oil apparently have become increasingly steady, having benefited by the strict control of crude production under the November allowables.

Encouraging was the prospect that market outlets would be provided shortly for the approximately 600 unconnected wells in East Texas. That relief would be given was indicated by the replies of over a dozen crude purchasers to a request sent out by Chairman E. O. Thompson of the Texas Railroad Commission, asking the buyers to cooperate in taking oil from the unconnected wells.

Refined Oil Markets

The markets for refined products also are generally steady, and prices are holding unchanged.

The gasoline market has been strengthened by the improved inventory situation. Stocks of gasoline were further reduced in the week ended November 12, although they normally are increasing at this time of the year. The gasoline storage now is only about the same as at this time last year.

Fuel oil demand is running considerably higher this year than last year, and this consumption is holding prices steady, despite the relatively large inventories now on hand.

The East Texas field has been a source of distressed priced crude for some weeks, due to approximately 500 wells being without a market outlet. These wells were served by local systems that have discontinued buying oil at the posted price. The latter have continued to run the oil, with few exceptions, to be stored for the account of the producer.

Owners of the oil accumulating in pipe line storage need their production revenue to meet obligations, and for this reason have readily accepted price sacrifices, ranging from 10 to 15 cents per barrel, in making spot sales. The aggregate of these spot offerings have been adequate to create a sore spot on the general market. Oil purchased under these conditions is in demand, and is generally consigned to tanker loading terminals on the Texas Coast.

Prices of crude and products unchanged

Prices in the industry continue generally steady, from well to retail outlet for products, as conditions in the industry and in the general business situation remain favorable..

Crude prices appear firm, and likely will continue so the rest of the year, as strict regulation of production is expected to be extended through December.

The gasoline market is being favorably affected by the holding down of inventories, under moderate refinery operations. The prices of gasoline consequently are generally steady.

Natural Gasoline

Natural gasoline, grade 26-70, was priced generally in the Mid-Continent markets f.o.b. refineries at 2⅞ to 3 cents a gallon, and sales were reported at 2¾ cents f.o.b. Breckenridge, Texas.

Gasoline Prices

U. S. motor gasoline ranged in the Oklahoma market last week about as follows: 62 octane and below, 3¾ to 4½ cents a gallon; 63 to 66 octane, 4 to 4⅝ cents; 67 to 69 octane, 4⅜ to 4⅞ cents; 70 to 72 octane, 4⅝ to 5⅜ cents.

Corresponding prices in the Chicago market were 3½ to 4 cents, 3¾ to 4⅝ cents, 4 to 4¾ cents and 4⅛ to 4⅞ cents.

In East Texas the most common gasoline, 60-62, 400 end point, was priced generally at 4 to 4½ cents a gallon.

Kerosene Postings

Kerosene prices f.o.b. Oklahoma refineries ranged from 3⅞ to 4¼ cents a gallon for the 41-43 water white grade, and from 4¼ to 4⅝ cents for the 42-44 water white grade; and corresponding prices in the Chicago market were 3¾ to 4¼ cents and 3¾ to 4⅜ cents.

Fuel Oil Quotations

Fuel oil prices were not materially changed in the past week. In the Chicago market range oil was priced from 3¾ to 4 cents a gallon. The No. 1 white oil was priced from 3⅝ to 3⅞ cents, and No. 1 straw from 3⅝ to 3¾ cents. No. 2 straw was 3½ to 3⅝ cents. No. 3 oil was 3¼ to 3⅜ cents. No. 5 oils were 60 to 70 cents a barrel. The No. 6 oil was quoted at 35 to 45 cents.

Oil industry statistics continue satisfactory

The statistics of the industry continue to show satisfactory crude production and refinery runs, economic inventories of gasoline and crude oil, and good consumption of fuel oils.

United States crude oil production in the week ended November 12, as reported by the American Petroleum Institute, averaged 3,243,250 barrels daily. That was much less than the output in the previous week, which averaged 3,628,550 barrels a day. The sharp decline reflected the restoration of the Saturday and Sunday shutdowns in Texas, which were temporarily lifted in the final week end of October.

Crude oil runs to stills in the week ended November 12 averaged 3,180,000 barrels daily, or 20,000 barrels a day more than in the previous week. The runs were, however, 4.6 percent lower than in the corresponding week last year.

Gasoline stocks were contra-seasonally reduced about 700,000 barrels in the week ended November 12, having come down to 67,551,000 barrels. They were then only 8/10 of 1 percent larger than at the corresponding time last year.

Gas and fuel oil stocks again rose slightly, and reached another new all time peak of 154,666,000 barrels. They were then 27.8 percent larger than one year previously.

Bureau's issue final summary for 1937

United States crude oil production in 1937 reached the record breaking figure of 1,279,160,000 barrels, 16 percent above the previous record of 1,099,687,000 barrels in 1936, it was reported by the Bureau of Mines, November 10 in its final summary for the year.

Natural-gasoline production virtually kept pace with crude output, rising 15 percent to a total of 49,177,000 barrels, the report showed, however, the bureau commented, this was several percent below the record totals of 1929 and 1930, when the practice of maintaining gas/oil ratios as low as practicable was not nearly as general as it is today.

Although benzol production declined rapidly in the last quarter due to shutdowns at steel mills, the total for the

year rose to 2,790,000 barrels from 2,502,000 barrels in 1936. Imports of crude, however, declined from 32,327,000 barrels to 27,484,000 barrels, about half of the decrease resulting from labor troubles in Venezuela in January and February.

"From the standpoint of stocks of all oils," the report pointed out, "the record of 1937 was not nearly as favorable as that of the previous year, a decline of about 22,500,000 barrels for 1936 being succeeded by an increase of double that amount. The principal shift affected crude oil stocks, which increased about 18,000,000 barrels in 1937 compared with a decline of about 26,000,000 barrels in 1936."

Most crude oil postings east of California were raised ten to twelve cents per barrel in the latter part of January, 1937, after which no further changes were made in the year, the bureau found. The result was that the national average value per barrel rose from $1.09 in 1936 to $1.118 in 1937. Only two states, Michigan and Montana, had a lower average value in 1937 than in 1936. The average production per well per day rose from 8.7 barrels in 1936 to 9.8 barrels last year.

"The maintenance of relatively high prices for crude oil stimulated field work and 22,143 oil wells were completed, or 24 percent more than in 1936," the bureau reported. "The number of producing wells rose to a new peak of 363,030, or 13,580 more than were active the first of the year. That production was relatively more profitable in 1937 is indicated in the figure of net abandonments for that year (8563), which was equivalent to only 39 percent of completions, compared with about 50 percent in 1934, 1935 and 1936.

"Only five states (Kentucky, Ohio, West Virginia, Colorado and Montana), all of small production, had a lower output in 1937 than in 1936. Production in Texas increased nearly 20 percent over 1936 to a new peak of 510,318,000 barrels. Important increases were recorded in Illinois, Kansas and New Mexico. All the major districts of Texas registered gains, but in California and Oklahoma the increases were in 'rest of state,' that is, in the newly developed areas."

Crude runs to stills in 1937 increased 11 percent, rising to a new high of 1,183,440,000 barrels, the bureau found.

With ample supplies of crude available, it was pointed out, there was little incentive to increase gasoline yields, and the average declined from 44.1 percent in 1936 to 43.9 percent the following year. The principal change in yields was a gain of about one percent in burner oils and distillates, principally at the expense of residual fuel oil.

"The domestic demand for motor fuel in the first quarter of 1937 was 11 percent above that of the corresponding period of 1936 but by the last quarter of the year the gain had shrunk to three percent," the report commented. "The total for the year of 519,352,000 barrels was eight percent above the 1936 figure. Exports were about a third higher than in 1936, the 1937 total being 38,306,000 barrels. Motor-fuel production in 1937 was geared to a demand at least ten percent higher than in 1936 and when this did not materialize stocks rose well above the 1936 levels. Thus stocks of gasoline on December 31, 1937, totaled 76,990,000 barrels, or nearly 14,000,000 barrels above the level of the first of the year.

The annual increase in heating oil demand tapered off in 1937, when the total was about 115,000,000 barrels, or 'only' 15 percent higher than in 1936. The domestic demand for kerosene increased seven percent, probably a reflection of continued gains in the use of range oils. Although the demand for residual fuel oil increased six percent, the demand for the last quarter of 1937 was less than that of 1936, presaging the comparatively poor statistical record so far experienced in 1938."

Trends of United States Production and Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

WEEK ENDED	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stock (Barrels)	Gasoline Stocks (Barrels)	Gas & Fuel Oil Stocks (Barrels)
September 25, 1937	3,666,300	*3,455,000	307,974,000	65,620,000	116,472,000
October 2	3,647,450	3,400,000	309,036,000	65,266,000	117,076,000
October 30	3,602,950	3,345,000	307,140,000	66,836,000	121,070,000
November 27	3,425,800	3,325,000	304,156,000	68,544,000	121,616,000
December 25	3,492,600	3,245,000	303,294,000	74,437,000	118,659,000
January 1, 1938	3,436,600	3,320,000	303,468,000	77,291,000	118,660,000
January 29	3,357,650	3,170,000	304,286,000	84,844,000	118,793,000
February 26	3,322,800	3,170,000	305,167,000	90,719,000	120,958,000
March 19	3,322,550	3,080,000	306,380,000	*93,192,000	122,067,000
March 26	3,405,600	3,080,000	307,557,000	92,858,000	122,979,000
April 30	3,396,150	3,215,000	307,147,000	91,339,000	128,270,000
May 28	3,098,650	3,150,000	301,583,000	87,946,000	134,315,000
June 25	3,083,900	3,025,000	293,463,000	82,412,000	137,801,000
July 30	3,316,400	3,240,000	288,514,000	76,864,000	144,294,000
August 27	3,388,500	3,255,000	285,029,000	71,754,000	146,926,000
September 24	3,251,150	3,220,000	280,278,000	68,605,000	150,468,000
October 1	3,231,800	3,235,000	280,852,000	68,602,000	151,759,000
October 29	3,237,500	3,145,000	275,824,000	67,590,000	153,719,000
November 5	3,628,550	3,160,000	275,217,000	68,236,000	154,576,000
November 12, 1938	3,243,250	3,180,000	.....	67,551,000	*154,666,000
November 13, 1937	3,541,450	3,335,000	†307,224,000	67,035,000	121,012,000
Change in past year	—8.4%	—4.6%	—10.4%	+0.8%	+27.8%

* All time peak. † Stocks, November 6, 1937.

Bloomingdale townsite crude price reduced

All buyers in the townsite of Bloomingdale, Michigan, posted a 15-cent per barrel price cut the past week, thus giving lot wells a 15-cent differential with outside pools. The townsite price is 73 cents per barrel. Considerable oil, it is reported, is being sold for less than 73 cents. One buyer reportedly contracted for 45,000 barrels at a flat 25 cents.

Crude Production

United States output gains 9,600 barrels daily to 3,257,400 barrels; still below bureau estimate

United States crude oil production showed a moderate gain during the week ended November 19, having averaged 3,257,400 barrels daily. That was 9600 barrels a day more than in the previous week.

At the new level, the production was, nevertheless, 133,600 barrels a day lower than the indicated average daily market demand for domestic crude, as estimated by the Bureau of Mines. Consequently, the output of the wells was low enough, apparently, to permit additional withdrawals of oil from storage, which is still highly desirable.

As compared with the 3,257,400 barrels actual daily production in the week of November 19, the Bureau of Mines had estimated market demand for 3,391,300 barrels of domestic crude daily in November.

With the exception of Oklahoma and Louisiana, all major producing states increased their production during the past week, which accounted for the nation's higher output.

Texas production increased 7300 barrels to 1,258,900 barrels daily, and was 112,100 barrels under the Bureau of Mines recommendation and 20,753 barrels under the state allowable.

California was up 11,300 barrels daily, having averaged 674,700 barrels a day. That was 58,000 barrels more than the federal allocation and 59,700 barrels more than the recommendation of the Central Committee of California Oil Producers.

Oklahoma showed a small decline, the daily production having averaged 447,925 barrels, which was 2775 barrels less than in the previous week, 67,075 barrels less than the Bureau of Mines estimate, but 19,925 barrels more than the allowable prescribed by the state.

Kansas registered an increase of 6050 barrels, having averaged 154,125 barrels a day. That was 10,175 barrels a day less than the indicated demand and the state allowable.

Louisiana averaged 259,250 barrels daily, or 4450 barrels less than in the previous week. The daily production, however, was 2950 barrels above the Bureau of Mines recommendation and 23,750 barrels above the state allowable.

Bureau reports sharp September output drop

two months, average daily crude petroleum production in September dropped sharply, to 3,288,700 barrels it was reported by the Bureau of Mines November 10.

The September figure represented a loss of 136,000 barrels from the August daily average and was about 380,000 barrels under that of the corresponding month last year, the report showed. Production was 78,100 barrels a day under the average estimated by the bureau in its forecast for the month.

A combination of a lower daily average and a shorter month brought total output for September below the 100,000,000 barrel mark, the production of 98,661,000 barrels comparing unfavorably with the 106,165,000 barrels produced in August and the 110,052,000 barrels recorded in September 1937.

For the first nine months of the year, production totaled 910,570,000 barrels compared with 956,833,000 barrels in the same period last year, and the daily average declined to 3,335,000 barrels from 3,505,000 barrels, the bureau reported.

Texas Responsible

The decline in production in Sep-

United States Crude Oil Production

Estimates Compiled by The OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Recommendation (Daily in Nov.)	State Allowable Nov.	BARRELS DAILY FOR WEEK ENDED Nov. 19	Nov. 12
TEXAS—				
Texas Panhandle	.....	.....	59,300	62,100
North Texas	.....	.....	75,200	73,500
West Central Texas	.....	.....	31,700	31,100
West Texas	.....	.....	201,800	199,100
East Central Texas	.....	.....	89,400	90,100
East Texas Field	.....	.....	371,200	370,200
South Texas	.....	.....	223,100	222,800
Texas Gulf Coast	.....	.....	207,200	202,700
Total Texas	1,371,000	1,279,653†	1,258,900	1,251,600
CALIFORNIA—				
Long Beach	.....	.....	54,600	53,700
Santa Fe Springs	.....	.....	31,700	29,800
Huntington Beach	.....	.....	32,300	32,200
Dominguez	.....	.....	28,300	28,800
Ventura Avenue	.....	.....	34,000	35,900
Midway-Sunset	.....	.....	63,900	49,800
Kettleman Hills	.....	.....	61,200	63,800
Wilmington	.....	.....	96,300	95,600
Others	.....	.....	272,400	273,800
Total California	616,700	615,000	674,700	663,400
OKLAHOMA—				
Oklahoma City	.....	.....	98,425	101,900
Seminole Area	.....	.....	102,475	105,275
Fitts	.....	.....	38,750	37,075
Others	.....	.....	208,275	206,450
Total Oklahoma	515,000	428,000	447,925	450,700
LOUISIANA—				
North Louisiana	.....	.....	69,850	71,600
South Louisiana	.....	.....	189,400	192,100
Total Louisiana	256,300	235,500	259,250	263,700

DISTRICT OR STATE	Bureau of Mines Recommendation (Daily in Nov.)	State Allowable Nov.	BARRELS DAILY FOR WEEK ENDED Nov. 19	Nov. 12
KANSAS—				
Burrton-Haven	.....	.....	8,575	9,550
Russell County	.....	.....	10,150	8,150
Silica	.....	.....	22,250	21,275
Others	.....	.....	113,150	r109,100
Total Kansas	164,300	164,300	154,125	148,075
NEW MEXICO	111,000	108,400	106,100	103,900
MICHIGAN	50,300	.....	52,400	54,400
ARKANSAS	52,300	52,000	50,750	49,375
MOUNTAIN STATES—				
Wyoming	74,700	.....	50,900	49,200
Montana	13,300	.....	13,700	13,300
Colorado	4,000	.....	4,050	3,950
Total Mountain States	92,000	.....	68,650	66,450
EASTERN STATES—				
Pennsylvania Grade	.....	.....	71,200	73,800
Southern Illinois (New Pools)	.....	.....	78,200	87,100
Illinois-Indiana (Old Pools)	.....	.....	12,800	13,200
Others, Eastern	.....	.....	22,400	22,100
Total Eastern States	162,400	.....	184,600	196,200
Total United States	3,391,300	.....	3,257,400	3,247,800

† Daily average, considering Saturday and Sunday shut-downs.

* Recommendation of Central Committee of California Oil Producers.

tember was primarily in Texas, which had both Saturday and Sunday shutdowns in that month, compared with Sunday shutdowns only in August, it was explained. The daily average production for the state accordingly declined from 1,412,200 barrels in August to 1,261,000 barrels in September.

The remainder of the producing states showed a slight gain in production although some, including California, Oklahoma and Kansas, also had declines. The most notable gain in output was in Illinois where the daily average rose from 66,500 barrels to 85,100 barrels.

The bureau survey showed that in spite of the material decline in production, crude stocks were reduced by but 3,500,000 barrels.

Primarily because of heavy reruns, but partly because of declines in production of most of the minor products, the bureau found, the yields of gasoline, gas oil and distillates, and residual fuel oil all increased over August, the gasoline yield reaching 45.3 percent, the highest since July, 1935.

"As generally expected," the bureau commented, "the domestic demand for motor fuel for September was disappointing, being only 46,058,000 barrels, compared with 47,515,000 barrels for September, 1937. The primary factor in this decline was the poor weather in some important consuming areas. On the other hand, the generally fair weather and business upturn of October should compensate September's deficiency in demand.

"Exports of gasoline declined sharply, the total being 3,528,000 barrels, compared with 4,829,000 barrels in August and 4,456,000 barrels in September, 1937. Here again, indications point to a reaction in October. The high yield and low demand led to a subnormal reduction in gasoline stocks, the total for finished and unfinished on September 30 of 69,086,000 barrels being only about 1,900,000 below stocks the first of the month and about 3,700,000 barrels above the level in 1937.

"The September statistics for the other refined products were not particularly encouraging, demand for the fuel oils continuing to run under a year ago. A bright feature was in the apparent strong demand for industrial lubricants."

According to the bureau of labor statistics, the price index for petroleum products in September was 56.4, compared with 56.7 in August and 62.2 in September, 1937.

Details of supply and demand for the month, as computed by the bureau, were as follows:

New supply: Domestic production; crude, 98,661,000; daily average, 3,289,000; natural gasoline, 4,081,000; Benzol, 144,000; total, 102,886,000; daily average, 3,430,000.

Imports: Crude in bond, 159,000; for domestic use, 1,415,000; refined in bond, 2,041,000; for domestic use, 635,000.

Total new supply, all oils, 107,136,000; daily average, 3,571,000.

Decrease in stocks, all oils, 3,305,000.

Demand: Total, 110,441,000; daily average, 3,681,000. Exports, crude, 5,577,000; refined products, 9,487,000. Domestic demand: motor fuel, 46,058,000; kerosene, 4,187,000; gas oil and distillate fuels, 8,627,000; residual fuel oils, 23,082,000; lubricants, 2,127,000; wax, 69,000; coke, 636,000; asphalt, 3,017,000; road oil, 1,098,000; still gas, 5,287,000; miscellaneous, 131,000; losses, 1,058,000; total domestic demand, 95,377,000; daily average, 3,179,000.

Stocks: Crude: Refinable in United States, 282,136,000; heavy in California, 17,535,000; natural gasoline, 8,159,000; refined products, 268,124,000; total, all oils, 575,954,000; days' supply, 156,000.

Supply and Demand of All Oils

(Thousands of barrels)

	Sept., 1938	August, 1938	Sept., 1937[1]	January-September 1938	January-September 1937[1]
New Supply:					
Domestic production:					
Crude petroleum	98,661	106,165	110,052	910,570	956,833
Daily average	3,289	3,425	3,668	3,335	3,505
Natural Gasoline	4,081	4,226	4,324	37,353	36,079
Benzol[2]	144	133	257	1,163	2,232
Total production	102,886	110,524	114,633	949,086	995,144
Daily average	3,430	3,565	3,821	3,477	3,645
Imports:[3]					
Crude petroleum:					
Receipts in bond	159	192	187	2,116	1,482
Receipts for domestic use	1,415	1,522	2,164	16,384	18,750
Refined products:					
Receipts in bond	2,041	1,724	2,463	15,089	17,668
Receipts for domestic use	635	1,229	434	5,729	5,958
Total new supply, all oils	107,136	115,191	119,881	988,404	1,039,002
Daily average	3,571	3,716	3,996	3,621	3,806
Increase in stocks, all oils	[4]3,305	[4]4,741	238	11,968	41,313
Demand:					
Total demand	110,441	119,902	119,643	976,436	997,689
Daily average	3,681	3,868	3,988	3,577	3,655
Exports:[3]					
Crude petroleum	5,577	7,003	6,602	60,007	48,833
Refined products	9,487	10,763	10,349	87,547	79,296
Domestic demand:					
Motor fuel	46,058	50,459	47,515	388,745	391,723
Kerosene	4,187	4,292	4,397	38,985	37,862
Gas oil and distillate fuels	8,627	7,737	8,672	79,347	79,435
Residual fuel oils	23,082	23,775	26,408	209,576	244,759
Lubricants	2,127	2,002	1,968	15,877	17,763
Wax	69	81	84	790	821
Coke	636	473	586	4,121	4,206
Asphalt	3,017	3,201	2,913	18,953	17,417
Road oil	1,098	1,581	974	6,673	6,915
Still gas	5,287	5,753	5,574	47,038	48,610
Miscellaneous	131	158	218	1,338	1,756
Losses	1,058	2,624	3,383	17,439	18,293
Total domestic demand	95,377	102,136	102,692	828,882	869,560
Daily average	3,179	3,295	3,423	3,036	3,185
Stocks:					
Crude petroleum:					
Refinable in U. S.	282,136	285,640	310,271	282,136	310,271
Heavy in California	17,535	17,575	[5]	17,535	[5]
Natural gasoline	8,159	8,022	6,278	8,159	6,278
Refined products	268,124	268,022	243,993	268,124	243,993
Total, all oils	575,954	579,259	560,542	575,954	560,542
Days' supply	156	150	141	161	153

[1]Final figures. [2]From Coal Economics Division. [3]Imports of crude as reported to Bureau of Mines. All other imports and exports from Bureau of Foreign and Domestic Commerce. [4]Decrease. [5]Not available.

Natural gasoline output declines in September

Daily average production of natural gasoline declined slightly in September to 5,713,000 gallons from 5,726,000 gallons in August, and total production for the month was 171,402,000 gallons against 177,492,000 gallons in the previous month, it was reported by the Bureau of Mines November 10.

The greatest decrease in production occurred in East Texas, the bureau stated, but this was virtually offset by increases in the Appalachian district, Osage County, Kansas and Louisiana.

Production for the first nine months of the year, in contrast with the crude oil output, was about four percent higher than in the same period in 1937, total output being 1,568,826,000 gallons against 1,515,318,000 gallons and the daily average 5,747,000 gallons against 5,551,000 gallons.

The bureau's monthly report showed that stocks of natural gasoline increased nearly 6,000,000 gallons in September, reaching 342,678,000 gallons at the close of the month. The increase contrasted with a decline of 32,000,000 barrels in September. Holdings at the end of the month included 165,270,000 gallons at refineries, against 163,842,000 gallons August 31, and 177,408,000 gallons at plants and terminals against 173,082,000 gallons.

Bureau shows decline in refinery crude runs

Refinery crude runs to stills in September declined to 3,233,000 barrels a day, a drop of 36,000 barrels from the August daily average and 217,000 barrels less than in September, 1937, it was reported November 10 by the Bureau of Mines.

Receipts of crude at refineries averaged 3,216,000 barrels a day, of which 3,163,000 barrels was domestic. Imports of foreign crude continued below normal, the daily average of 53,000 barrels being 2000 barrels under that of August and 25,000 barrels below September, 1937.

With total refinery receipts running 96,468,000 barrels for the month, the runs to stills of 96,990,000 barrels and fuel and losses of 217,000 barrels created a deficit which brought stocks down from 51,721,000 barrels September 1 to 50,982,000 barrels at the end of the month, the report showed.

WEEK'S DRILLING HIGHLIGHTS

South Louisiana

The sixteenth new oil field in South Louisiana this year is Shell Petroleum Corporation's discovery at South Houma in Terrebonne Parish, producing from Miocene at 10,308 feet. New sands were found at Venice and Raceland, which probably will lead to extensive development.

Texas Gulf Coast

A drill-stem test in a Jefferson County wildcat inaugurates controversy as to whether a new field is found or Cheek has been extended. In Brazoria County, salt water cored in a wildcat on the highly respected Iowa Colony prospect was discounted as the showing was higher than in a previous failure. At Mount Houston in Harris County, source of gas that caused a blowout is in doubt.

Wyoming

A test is getting ready to core into the Wall Creek at Cole Creek. This is interesting because the Wall Creek has been the source of many barrels of production at Salt Creek, 24 miles from the current test.

New Mexico

Roosevelt County's threat of a new oil field is lessened by later showings in the test that has been attracting attention to the Milnesand geophysical prospect. Late reports are that there is not sufficient saturation in the lime for a commercial well. In the meantime operations in Lea County show some evidence of dropping off.

Kentucky

Henderson County wildcat is showing either for a new pool or a wide extension for the Birk City field. In the Spottsville area where the state's best producer recently was completed another is nearing the sand.

Indiana

A show in the Salem sand in a Knox County test was too tight for production but it is encouraging in that this sand previously has produced lots of good oil.

Illinois

A new pool was opened in Jefferson County, and several tests promise extensions of production in established fields.

California

Following closely upon discovery of production on the north edge of Buena Vista Lake, another wildcat east of Elk Hills in Kern County has a show that adds still further impetus to drilling in San Joaquin Valley. Three companies have pooled interests to make more thorough geophysical investigation, the latter method having been responsible for the two latest strikes.

Oklahoma

During the seven day period the state completed 30 wells, 16 being oil wells with a total initial output of only 1628 barrels. Four gas wells were completed for a total open flow of 15 million cubic feet and there were eight failures. Two locations were abandoned. Thirty-two stakes were driven during the week which nets an increase of 11 as compared to the previous week. Creek County leads with 5, followed by Tillman with 4, Lincoln, Pontotoc, Pottawatomie and Seminole 3 each, Oklahoma and Stephens 2 each, Caddo, Garfield, Grady, Greer, Osage, Sequoya and Tulsa with 1 each.

Kansas

Results of the week showed 20 oil wells completed for a total initial output of 18,684 barrels. No gas wells were completed, and there were 10 dry holes. Two locations were abandoned and one input well was completed. Twenty-one wells were started during the week which is an increase of 7 over the previous week. Barton County leads with 6, Cowley reports 5, Ellis 3, Rice and Stafford 2 each, Russell, Sumner and Woodson with 1 each.

Comparison of Permits Granted for New Wells

STATE	Week Ending Nov. 19	Total this Mo.	Total this Year	Total this Date Last Year	1937 Year Total
Arkansas	14	19	223	229	240
California	....	14	1,032	1,442	1,584
Louisiana	34	55	1,124	1,133	1,227
Kansas	21	55	1,369	2,491	2,663
Michigan	24	81	852	886	958
Oklahoma	32	92	1,826	2,514	2,711
Texas	202	559	11,397	15,767	17,238
Total	327	875	17,823	24,462	26,621

Summary of Wells Completed in the United States Week Ending November 19, 1938

	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total 1938	Total this Date, 1937
Alabama	....	....	....	....	.....	2	1
Arkansas	4	3	....	1	2,857	200	123
California	22	17	1	4	12,587	1,135	1,327
Colorado	1	....	....	1	.....	8	18
Florida	....	....	....	....	.....	....	1
Georgia	....	....	....	....	.....	1	....
Illinois	48	35	....	13	11,122	1,514	302
Indiana	....	....	....	....	.....	153	122
Kansas	31	20	....	11	18,684	1,522	2,440
Kentucky	18	11	3	4	2,171	723	478
Louisiana	22	12	2	8	2,922	984	895
Michigan	19	13	....	6	6,265	881	859
Mississippi	2	....	1	1	.....	19	14
Montana	....	....	....	....	.....	69	187
Nebraska	....	....	....	....	.....	1	....
New Mexico	12	8	....	4	4,715	481	624
New York	*12	10	1	1	28	*598	*1,138
North Dakota	....	....	....	....	.....	1	....
Ohio	15	3	8	4	75	848	1,339
Oklahoma	28	16	4	8	1,628	1,916	2,684
Pennsylvania	*30	25	4	1	55	*1,835	*2,685
Tennessee	....	....	....	....	.....	2	....
Texas	180	127	10	43	155,509	11,196	13,661
Utah	....	....	....	....	.....	3	....
West Virginia	17	2	14	1	5	638	849
Wyoming	3	2	1	....	2,609	99	97
Total this week	464	304	49	111	221,232	24,829	29,844
Total last week	552	397	48	107	277,301	....	.....
Total this year	24,829	17,202	1,785	5,842	15,616,226	....	.....

* Includes water-intake and pressure wells.

Oklahoma Fields

Second Wilcox sand pool opened in St. Louis district.

New field is discovered 10 miles north of Okemah.

Tulsa, Okla.—Despite the failure of more important wildcats to show for production, Oklahoma had one of the best weeks of recent months. Other tests are showing well, although not decisively at this time. Wildcats of major interest are somewhat disappointing, while those less closely followed succeeded in opening up new production.

Hall, Troop & Moore's Dameron 1, wildcat test north of east Konawa pool of Seminole County, has opened a new Cromwell sand pool. Location of the test is NWc SW 3-6n-6e, a short distance south of new Dora production. The well swabbed and flowed 188 barrels of 35 gravity crude and 1½ million feet of gas in 24 hours from lower Cromwell at 2827 feet.

Morgan Flynn et al's School Land 1, NEc SW 16-8-5e, Pottawatomie County pool opener of last week which was cutting some water, has had packer raised 6 feet to 4145 feet. From Hunton lime the well flowed 803 barrels of clean oil in 9 hours with the plug at the new depth.

In the St. Louis area of Pottawatomie County, central Oklahoma, Atlantic Refining Company proved a new second Wilcox sand pool in Goss 1, NW SE 6-6n-4e. The test had the top of the second sand at 4503 feet and drilled to a bottom at 4516 feet, still in the sand. Casing was set on total depth and was perforated between 4511 and 4512 feet. In the first two hours following perforation, the well filled 3500 feet with crude, and on later swabbing test the well made 284 barrels in four hours. Additional tankage is now being constructed.

Crude from Goss 1 tested 40 degrees, corrected. There was considerable gas with the oil although no gauge was made. No water was with the production, a fact which added to the importance of the strike. The well is the first producer in the Second Wilcox in this vicinity. In the same section, the same operators' Harris 1, NE NW SW 6-6n-4e, is drilling and coring at 4478 feet, nearing the pay zone. One other test has been drilled in the same section, but as it stopped when production was picked up in Dutcher sand above 2000 feet, it did not indicate deeper possibilities.

OKLAHOMA

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Caddo—		
English Drlg. Co., McKenna-Grogan 1, se nw se 11-5n-9w	79	5005
Magnolia Petroleum Co., McKenna 9, nwc se 11-5n-9w	281	3372
Phillips Petroleum Co., Farwell 1, sw nw nw 35-6n-10w	110	3436
Carter—		
Shell Petroleum Corp., Roy Johnson 24, 170 ft west ne se sw 4-4s-3w	8	995
Neff & Godfrey, Mobley 1, se sw se 13-4s-3w	*	1654
Coal—		
Campbell, Cunningham 1, c ne se 24-3n-11e	¶2	1402
Creek—		
Sinclair Prairie Oil Co., Farmer 1A, se ne sw 3-16n-7e	*	3004
Korf, Stark 1, nw ne ne 5-16n-9e	*	3660
Indo Oil Co., Wata-she 2, nec nw 4-17n-10e (pb 2630 ft)	60	2644
Big 4 Petroleum Co., Young 3, sec sw 13-19n-7e	30	2670
Jefferson—		
Davis, Barret 1, ne ne se se 14-6s-6w	*	1892
Latimer—		
LaFlore, Bascom-Maxey 29, cwl sw se nw 2-6n-22e	*	2000
Lincoln—		
Hubbel & McCann, Teeter 1, se sw ne 9-14n-6e	24	3186
Mudge Oil Co., Robertson 6, se nw sw 10-14n-6e	85	3126
Wilcox Oil & Gas Co., Saylor 2, nw sw nw 14-14n-6e	116	2868
DeLozier 12, ne nw nw 15-14n-6e	65	3006
Osage—		
Barnsdall Oil Co., 11, 137 ft west csl ne nw 21-23n-11e	6	2065
Pittsburg—		
Campbell, Featherston 1, cwl ne nw sw 19-3n-12e	¶5¾	1260
Pontotoc—		
Osborn, Jones 3, sw nw sw 33-5n-8e	¶6.6	2489
Pottawatomie—		
Denver P & R Co., Zoeller 2, nw ne se 5-6n-5e	47	4200
Sinclair Prairie Oil Co., Nadash 6, ne nw sw 29-7n-5e	332	4135
Seminole—		
Smith, Smith 1, nw ne ne 20-7n-6e	220	4326
Mallernee, Hemerick 1, nwc 34-7n-6e (pb 1858 ft)	90	2848
Magnolia Petroleum Co., Campbell-Andrews 8, ne sw ne 18-9n-6e (pb 3515 ft)	*	4298
Stephens—		
Coline, Johnson 1, sw se ne 1-2n-8w	75	9086
Winkler, Bristow 1, sw nw sw se 18-2s-7w	*	1426
Tulsa—		
Brown, Brown 1A, sw ne nw 24-19n-10e	*	1457
Bert et al, Moorman 1, sec se ne nw 15-16n-12e	¶¾	1975

*Failures; †Junked; ¶Million cu. ft. gas.

New Wilcox Pool

Okfuskee County obtained a new Wilcox sand pool ten miles north of Okemah and about two miles from nearest production. The discovery is Lease Investment Company's Fee 1, SE SW SE 21-13n-10e, which went to a total depth of 3549 feet in Wilcox sand after topping good saturation at 3600 feet. Forty quarts were used to break the sand, after which the well filled and began slopping over the casing top. During cleaning out operations all tankage was filled. Five-inch is being run to put the well on production. Viola lime was topped in the test at 3540 feet and carried a fair show of oil.

Another wildcat is showing for production in Cromwell sand, being Jones and Soper, Inc.'s Harris 1, SE SE NW 22-10n-7e, four miles north and west of North Bethel pool of Seminole County. The sand was cored between 3558 and 3574 feet, with the recovery showing good saturation. Pipe is being run prior to testing.

Oil Show in Calvin Area

Phillips Petroleum Company's Mandler 1, SE SW SW 1-6-10e, in Calvin area of Hughes County picked up a slight show of oil and some gas in Cromwell sand topped at 4290 feet. The test is now drilling shales and lime streaks without shows. This test has been closely followed by reason of numerous reports indicating possible production, none of which proved commercial.

In the Crews area of Logan County, Helmerich and Payne, Inc.'s Humphrey 1, NEc SW 27-16-1e, a southwest diagonal offset to Sinclair Prairie Oil Company's Crews 1, the discovery, has gone to salt water in the expected pay strata. Wilcox sand was topped at 5271 feet, and after picking up only a slight scum of crude, the hole filled 500 feet with water. Operators added fresh water to the well to agitate and bail.

A south offset to the discovery being drilled by the same operators, Strain 1, NWc SE of the same section, also missed finding production in Wilcox sand and continued to Dolomite where it picked up 9 feet of saturation above 5222 feet. Casing is being run preparatory to test.

Deep Test Progressing

Carter Oil Company's Smith 1, CSE SW 26-5-8w, in the old Chickasha gas field, is drilling shales and sands with some dolomitic streaks showing at 5243 feet. There is nothing showing at this depth although non-commercial shows were had higher up the hole. This test is scheduled to go to 10,000 feet provided satisfactory production is not encountered at a shallower depth. Extra heavy equipment has been installed so that the test can be continued past the projected depth if this is desirable.

In the eastern part of the state, Carter Oil Company's Hamilton 1, CW½ NE SW 33-4n-9e. Hughes County, has been plugged back to make a 22,000,000 foot gas well under pressure of 1650 pounds per square inch. This test was originally drilled as a wildcat to 6177 feet but was later plugged back to 5995 feet where it was completed for 95 barrels of oil with considerable water. Crude has been constantly decreasing and operators again plugged the well back to Cromwell sand and perforated with ten shots between 4228 and 4237 feet for gas.

Taylor 1, SEc SW 1-7n-2e, of Gulf Oil Corporation in the Noble area of Cleveland County is drilling and coring slowly ahead in Wilcox sand at 7670 feet with only minor shows of oil and gas. However, no water is showing, and the test may yet extend the Noble production discovered by Gus Delaney. A core form 7661 feet to 7666 showed 16 inches of porous sand carrying a slight show. A drill-stem test with packer at 7622 recovered only 350 feet of mud with a scum of oil and some free gas. Sand has been found more tight than was to be expected. Continuing coring in the test, operators recovered two feet of sandy dolomite above a total depth of 7670 feet, with only a few inches showing any oil. The test is reported to be running six feet lower than the Delaney well. With no water yet encountered, the test is continuing to core ahead.

Fox Area Development

The deep Fox area of southern Oklahoma, continually in the Mid-Continent limelight during the past three years following completion of Carter Oil Company's Ruth Williams 1, is in

the last stages of development as a major disappointment. Six completions in the deep Ordovician, one of them a gas well, have each failed to find production in any way comparable with the 10,000-barrel rating of Ruth Williams.

Five operations are under way to the 8000-foot strata at this time, one of them being a deepening process. Gulf Oil Corporation's McClure 2, C SE NE 28-2s-3w, Carter County, is being deepened to 8205 feet where it will be shot in the Oolitic lime pay. At 8175 feet the well had a production of 120 barrels of crude and 300 barrels of water. The other drilling tests are Magnolia Oil Company's Hefner-Mills 1, C SW NE 27-2s-3w, now drilling in Viola lime topped at 5585 feet. This test looked good higher up the hole as it was running high, but a thick section of Hunton lime threw the test low on structure. Gulf Oil Corporation's Garrett 8, C NW SW 27-2s-3w, is drilling below 7300 feet. Same operator's Empire 1, C SE SE 27-2s-3w is in Viola lime at 6028 feet and their Franklin 1, C NW SE 28-2s-3w is drilling at 7530 feet after recovering circulation. Carter Oil Company's Harley Community 1, C NE NE 24-2s-4w, across the line in Stephens County, has turned into a gas well after initial crude production dwindled.

Reservoir conditions have not been found to be encouraging. The lime is dolomitic and tight, requiring excessive acid treatment, one well using more than 40,000 gallons. Water has presented problems in most of the tests. Although the crude is of high gravity, generally above 50 degrees, it carries a high sulphur content. Natural gas with the crude is also quite sour. With no new locations announced, the deep Fox play is becoming history.

KANSAS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Barton—		
Phillips Petroleum Co., McClanahan 7, sw ne sw se 7-16s-13w	1308	3366
Stanolind Oil Co., Redetzke 3, 100 ft north cwl sw se se 26-16s-13w	368	3389
Shell Petroleum Corp., Schneider "B" 10, ne nw se nw 1-16s-14w	*	3320
Hoffman "B" 2, nec 12-16s-14w input well		3632
Shaffer, Barrett 1, ne swc nw 36-16s-14w	*	3469
Stanolind Oil Co., Panning 17, cwl nw se ne 2-20s-11w	*	3297
Kowalsk 11, cwl nw se ne 11-20s-11w	1991	3293
Butler—		
Cox & McGinnis et al., Augustine 2, ne se ne 1-25s-3e	50	2685
Adair & Norton, Ramp 1, sw nw sw 14-28s-7e	80	2691
Ellis—		
Cities Service Oil Co., Rumsey 4, nec sw 23-11s-17w	611	3423
Shell Petroleum Corp., Rumsey 16, sec nw 23-11s-17w	2914	3422
Cities Service Oil Co., Samuelson 2, cne¼ 36-11s-17w	*	3500
Greenwood—		
McGinnis, Dehlinger 2, nw se se 3-24s-13e	10	1652
Rosen et al, Trapp 2, cwl nw se ne 23-26s-9e	25	2160
Marion—		
Phillips Petroleum Co., Alvin 16, nw se ne nw 15-22s-4e	93	2511
McPherson—		
Cling et al, Unruh 1, c ne se 26-19s-2w	120	2975
H & M Drlg. Co. et al, Peterson 2, sw nw se 24-19s-3w	*	3042
Pottawatomie—		
Turner et al, Umshide 1, c ne sw 32-8s-9e	*	1985
Reno—		
Garden, Strickler 1, se nwc 17-22s-6w	*	4035

Kansas Field Developments

Three extension wells add acreage to proven fields. Silica and South Silica pools are shown to be one.

Wichita.—With drilling in Kansas confined almost strictly to the more favorable areas adjacent production, operations during the past week failed to open a new pool. Three extension wells, not as yet completed, are important and place a total of about 400 acres into proven area. After activity in the state reached a new low, as detailed in last week's issue, further decrease in development is apparent in the total operations for this week. Thirty-three wells were completed during the week while there were 21 first reports. This again lowers the number of active operations by 12 wells.

Two major pools in Kansas have been extended over the week. Continental Oil Company's Fuller 1, CEL SE 28-17-8w, west of Edwards pool of Ellsworth County filled to within 150 feet of the casing top after finding saturation in Arbuckle lime at 3320 feet after plugs were drilled. The well was shut in for additional tankage. This well, marked for early completion as a commercial producer, adds about 200 acres to the field and calls for about 14 more wells.

As had been anticipated, Silica and South Silica pools of Rice County are being proven to be the same. Indian Territory Illuminating Oil Company's Peters 1, NWc 13-20-11w, a quarter-mile south of Silica and about a half-mile north of South Silica pools, is the joiner well. From Arbuckle lime the test filled 800 feet from 3272 feet in the pay. Tubing is being run into this test for acid treatment. This completion may add between 100 and 400 acres to the productive area of the joined pools.

E. B. Shawver, Wichita operator with extensive holdings in Wellington pool of Sumner County, has given that pool an extension at Ludwig 1, SE SE NE 29-31-1w, northwest of major production and west of that section of the pool which has recently been showing some water. Production is from Mississippi chat at 3700 feet and was gauged at 630 barrels per day on first test.

Company, Well and Location	Init. Prod. Bbls.	Depth
Rice—		
Hollow et al, Beck 1, sec sw 6-18s-10w	*	3286
Stanolind Oil Co., Heine 1, 100 feet west sec 21-19s-10w	*	3325
Rooks—		
Vickers, Luhman 3, nwc se 11-9s-16w	277	3315
Russell—		
Shell Petroleum Corp., Major 1, swc ne 4-15s-12w (pb 3030 ft)	13	3289
Skelly Oil Co., Neidens 10, ne se ne 32-15s-13w	184	3266
Western Kansas Oil & Refining Co. et al, Schneider 1, nec nw 35-15s-14w	1861	3355
Stafford—		
Stanolind Oil Co., Hays 4, nw sw se 11-24s-11w	2171	3761
Hartnett 1, swc nw 13-24s-11w	513	3794
Pure Oil Co., Krey 11, nec se 14-24s-11w	2152	3795
Sinclair Prairie Oil Co., Krey 4, sec ne 14-24s-11w	1532	3795
Derby Oil Co., McComb 3, ne nw nw 24-24s-11w	2411	3822
Sumner—		
Murphy et al, Tate 1, sec nw 31-32s-2e	*	3762

*Failures; †Junked; ¶Million cu. ft. gas.

Location has been staked for a south offset. Other offsets are held on lease by Sinclair Prairie Oil Company.

C. E. Ash et al's Wilkens 1, SE SE NE 13-17-10w, in the undeveloped area of Wilkens production in southwest Ellsworth County, is adding to proven acreage from Arbuckle lime. Pay was had at 3282 feet and resulted in a 2500 foot fill-up. Top of dolomite was picked at 3254 feet. Tubing is being run preparatory to a test.

Gas production in the Downs area of Sedgwick County, southeast of Wichita has been increased by completion of the second producer. The well is Harwood Oil Company and Lauck Petroleum Company's Shockey 1, NE NE SW 32-28-2e, at present shut down for pipe line connection into Cities Service Company's natural gas system. The test topped Stalnaker sand at 2211 feet and picked first gas showing only a foot in the section. Casing was run to 2201 where it was cemented. Total depth in the pay is 2226 feet where the well gauged 10,480,000 cubic feet of sweet gas with a b.t.u. of 1025.

The farthest northwest wildcat in Kansas has been abandoned. The well, John E. Mabee, Inc., et al's Ryan 1, CNE SE 27-8-32w, near Halford in Thomas County, completed in Arbuckle lime at 5312 feet as a dry hole. The location is at the north edge of the Dodge City basin and southwest of the probable extension of the trend of the Kansas City uplift. Wildcats in this region have found substrata conditions similar to those prevalent on the uplift, but have not succeeded in drilling saturation despite apparently favorable locations on geologic highs.

South of this well in Scott County, Atlantic Refining Company's Mark 2 CW½ SW 14-20-33w, in Shallow Water pool, farthest west crude production in the state has pulled a saturated core from Mississippi lime between 4564 and 4582 feet. Hole is being deepened into the pay which produces in the other wells in the field.

Many Kansas operators are looking toward the lease play now under full steam in Missouri where independents and majors are blocking up favorable acreage. Two tests are to be started immediately. Tools are on the ground for one and the stake is driven for the second. Most of the present activity is centered in the west central section of north Missouri in the eastern arm of Forest City basin.

Western Kansas Oil & Refining Company's Keil 1, NE NW NW 6-15-13w, one half mile south of Hall pool, Russell County, may be an extension to the productive area in Lansing lime. The well swabbed 10 barrels per hour but will be drilled to 2925 from its present depth of 2916 feet before a potential test is made.

In Ellis County, Courtney B. Davis et al's Richards 1, NE NW SW 5-11-18w, south offset to Richards production, is drilling conglomerate at 3636 feet and will be deepened to test the Arbuckle lime. Other production in this pool is from Lansing lime. This test may prove another pay zone for the area.

North Texas Developments

Extension of Strawn horizon is indicated at Hull-Silk. Wildcat one mile northeast of Holliday is encouraging.

Wichita Falls, Texas. — Northwest extension for the lower Strawn oil horizon in the Hull-Silk field, Archer County, was in prospect the past week. Thurmond and R. C. Lipscomb's Wilson 2, NEc of E. Hall Survey, cored oil saturation at 4234-36 feet, and has landed pipe for a production test. Sandy lime at 3945-86 feet, carrying oil saturation, was passed up to try for production in the more prolific zone. The Texas Company's Wilson 34-A, offsetting lower Strawn producers in the southwest portion of the field, was showing for 30 barrels oil and 15 barrels of salt water daily on bailing test after 50-quart nitro shot at 4396-4409 feet. It was plugged back from water at 4428 feet. Sinclair Prairie Oil Company's Hood 1, mile west of production, is slated for abandonment after failing to produce from gun-perforations opposite the Strawn section. It was carried to Ellenberger at 5180 feet, then plugged back to 4976 feet.

Westmount Oil Company's Dempsey 7, Block 10, mile northeast of Holliday, Archer County, filled the hole full of fluid, including 150 feet of live oil on top of the salt water column, while testing with tubing packer to try and locate the source of the water. This wildcat Strawn test, located amidst shallow production, plugged back 4616 feet and gun-perforated at 4210-25 feet and 4135-65 feet. Another Strawn test may be drilled on the strength of this showing.

L. S. Youngblood, R. L. Foree et al's Burnett 1, Montague County wildcat situated one mile west of Nocona, developed 3500 feet of salt water when tested in lower Strawn, carrying oil saturation, at 4139-45 feet. Considerable trading in leases and royalties took place when this test shutdown to run pipe. It is contracted to drill to 4200 feet.

New Test at K-M-A

K-M-A added only one new test the past week, and currently has 19 wells in process of completion, with rotary rigs in service on 13 additional sites. A greater portion of the field work is within and adjacent to the Big Wichita River, and in the extreme west sector. Continental Oil Company and Hammond's Munger 2-B-A, northeast corner of lease, Block 31, situated on the southeast edge of the field, encountered salt water in drilling to 3906 feet. The hole has been plugged back to 3860 feet for nitro shot in broken pay topped at 3824 feet.

Continental Oil Company's Waggoner Bros. 4-B, adjacent to the company's natural gasoline plant in the northwest portion of the field, proved capable of taking 100,000 cubic feet of input gas daily at 1733 pounds pressure. It was drilled for this purpose, and plugged back from shale at 3785 feet to the base of the upper oil sand at 3761 feet.

A second test is scheduled for the Asylum oil pool uncovered last summer in southeastern Wichita County by the Petroleum Producers Company and Continental Oil Company. Derrick has been erected for A. Finkler 1, Green Reynolds Survey, south offset to the discovery, which pumped 136 barrels initial after series of nitro shots and acid treatments in lime near the contact of the Bend and Ellenberger, after plugging back from 5405 feet to 5375 feet. It is the deepest producer in North Texas.

NORTH TEXAS Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Archer County (K-M-A)—		
C. H. Staley et al, Mangold 7, blk 32	768	3850
Archer County—		
King & McCurdy, T. S. Ikard 1	*	1168
M-L Drl. Co., Prideaux 2	*	690
Prideaux 3	*	696
W. B. Omohundro et al, Thuman 5, sec 28	100	989
Sinclair Prairie, Hood 1, sec 18 (w)	*	5180
Baylor County—		
J. F. Morrissey & Co., J. White 1 (w)	*	510
H. F. Wilcox O&G Co., Fritz 1, sec 193 (w)	*	5277
Cooke County—		
Hudspeth & Harvey, Wilson 2	*	1250
The Texas Co., M. Kessler 5	15	1358
Trubenbach 16	60	776
Foard County (Johnson)—		
The Texas Co., Johnson 17, sec 37	*	3807
Jack County—		
Jess E. Martin et al, Bloodworth 1	*	340
Nelson Oil Synd., Eatherly 6	368	2815
Eatherly 7	403	2812
H. M. Tebay et al, E. B. Sewell 2	4	300
Wichita County (K-M-A)—		
Blackwell O&G Co., Hodges 8	480	3792
Continental, Waggoner Bros. 4-B (key well)	*	3785
Dorian & Jackson, Denny 2	696	3930
E. C. Oil Co., LeBus-Whitaker 7	600	3830
Wichita County—		
Carey & Carey, J. A. Kemp 2, blk 59	*	785
J. C. Clower et al, Goetze 16	7	362
Young County—		
Cable Oil Co., Williams 6	55	576
Christie Bros. et al, J. E. Martin 1 (w)	*	4715
Holbrook & Wood, Watson 12-B blk 22	*	614
Tebay & Leberman, Leberman 5, sec 154	10	992

*Failures; †Junked; ‡Million cu. ft. gas.

Disagreed on spacing for Slaughter field

Austin, Texas.—Operators appearing before the Texas Railroad Commission last week at a hearing on the Slaughter field, Hockley County, differed over a method of allocation.

Major companies had sought 40-acre spacing and a proration program based on this unit. They advocated an allowable based on 50 percent acreage plus 50 percent acreage times potential.

David Donoghue, independent geologist appearing for the Slaughter royalty interests and supported by S. W. Richardson, asked for 17.7-acre proration units because the field is divided into Spanish "labores," and because the royalty owners wanted more wells. This plan would permit operators to drill only one well on each two 17.7-acre units, or one well to 35.4 acres if they chose to follow that plan.

However, proration would be based on 50 percent acreage and 50 percent potential and no potential allowance would be given on the second unit unless the second well was drilled. Donoghue insisted that the royalty owner was giving up some of his rights when he did not demand a well to 10 acres. He said that the dolomitic producing formation was tight and that closer spacing would get more oil.

Humble Oil & Refining Company attorneys pointed out that there is now no market for the extra oil that might be produced from additional wells, as it has the only pipe line and that line is now filled to capacity. Lower allowables for each well will follow if more are drilled, these attorneys said.

Cooke County producing properties are bought

Wichita Falls, Texas.—Burk Royalty Company and Owen M. Murray have acquired 33 pumping wells, with a combined output of 335 barrels of oil daily, in the Anderson-Kerr pool, near Gainesville, Cooke County. Six leases, with 22 wells, were purchased from the Denver Producing & Refining Company on a basis of $600 per barrel for the 175-barrel gross production. Two leases, with 11 wells yielding 160 barrels gross production daily from the 2000-foot pay, were bought from Whitfield, Pearson & Grimes on a basis of $550 per barrel.

Collinsville hearing

Austin, Texas.—A hearing on the new Collinsville pool, Grayson County, has been scheduled for December 7, by the Texas Railroad Commission. The hearing will be held in Austin.

At this meeting the commission will hear evidence upon which it will base rules for operating wells in the new field.

Core analysis discussed

The Mid-Continent Section of the AIMME is sponsoring a joint meeting with the Tulsa Geological Society, November 21, at the Tulsa Building, Tulsa, at 8:00 P.M. The subject of the paper is Core Analysis and Interpretation, by Howard C. Pyle and John E. Sherborne, of Union Oil Company of California. Pyle was scheduled to present the paper at the open meeting.

Carbon black is scientific production of valued soot

Many strange sights can be seen on that flat, desolate stretch of land called the Texas Panhandle, but few more spectacular than a carbon black plant in full operation. From a distance one sees a group of long, low shed-like buildings from which rises an enormous black cloud. Under this cloud and inside the buildings, men, flames, and machinery are engaged in the scientific production of soot.

Soot is ordinarily considered as a nuisance, but to many industries it is a necessity. Carbon black is a specially valuable kind of soot and its rise to importance as a manufacturing material is one of the most fascinating phases of America's industrial growth. Al-

though used for years in paint, ink, dry color, and crayon manufacture, not until just before the world war did carbon black assume world-wide importance.

Today wherever the automobile, the printed page, and the painted or lacquered surface are found, carbon black plays an indispensable role. It has made possible the development of the modern, long-mileage motor vehicle tire. Research is extending its use to improve the strength, appearance and permanence of other products, such as paper and plastics.

By-Product Industry

Carbon black is manufactured in the oil and gas fields in plants covering 160 acres. It is produced by the impingement of natural gas flames on moving steel channels.

The channels shift back and forth over many small flames, and as the gas burns the carbon black is deposited on the steel channels later to be removed by stationary scrapers. It falls into hoppers from which it is carried through conveyors to the packing houses, where excess air and gases are removed by an agitating process. It is then bagged and compressed in 12½ and 25-pound paper sacks. Sometimes it is molded into pellets.

Considering the miles and miles of gas pipes, the intricate conveyor systems and automatic equipment, this process of handling is carried out with amazing speed, cleanliness and efficiency. It is a tribute to the engineering ability and thoroughness of the petroleum industry for it is manufactured from the waste and natural gas which would find no market elsewhere.

Practically all the carbon black used in the industrial world is produced in the southwestern part of the United States. The business moves with the discovery of new and bigger oil and gas fields. Starting in Pennsylvania, its center was shifted to West Virginia, then to Louisiana—and is now concentrated in the Texas Panhandle.

Helium has become important commodity

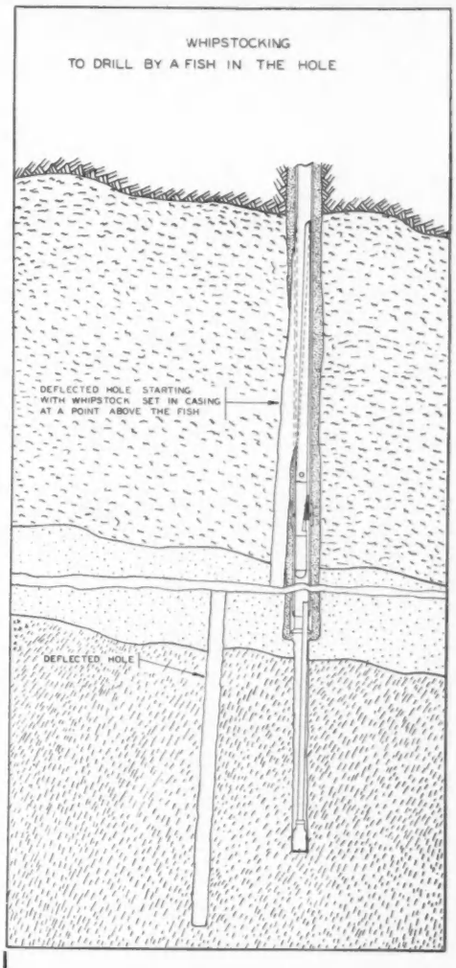
Jubilation reigned in Dexter, Kansas, in 1907. Everybody was excited about the new gas well that was being drilled. If it came in, there would be money in pockets and fuel for cook stoves.

The well boomed in with 6,000,000 cubic feet. Celebrations were in order. Then, some one made a discovery that caused consternation. The gas wouldn't burn. What good was gas that wouldn't fry eggs?

A hurry call went out for some trouble shooters—Drs. H. P. Cady and D. F. McFarland of the University of Kansas. They identified it as helium, a gas first observed in the sun during an eclipse in 1868. While it won't burn, the eyes of the world are focused on it today, for it will keep a dirigible afloat without danger of fire or explosion.

After the first adequate helium supply was discovered at Dexter, it was neglected until 1914, although eventually the town built a new industry around the gas. This lasted until a government plant near Amarillo, Texas, brought in enough to supply aircraft needs. By 1925 the value of the gas was well

IT'S OFTEN PROFITABLE TO SIDETRACK A "FISH"


WHIPSTOCKING
TO DRILL BY A FISH IN THE HOLE
DEFLECTED HOLE STARTING WITH WHIPSTOCK SET IN CASING AT A POINT ABOVE THE FISH
DEFLECTED HOLE

Fishing for lost tools is often a very expensive procedure. In many cases fishing jobs run into big figures, only to find in the end that sidetracking is the only way out.

When a particularly difficult job is encountered, it is good practice to check the possible and probable costs and results of continued fishing against the reasonably accurate known costs and results of sidetracking.

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established. A field discovered near Amarillo was found to be twice as rich in helium as former discoveries. The helium obtained from it was 98 percent pure.

Helium is refined by subjecting natural gas to great pressure at temperatures as low as 300° below zero, F. At this point the nitrogen and other elements liquefy, the helium doesn't. It is drawn off, the other elements returned to a gaseous state and sold.

Doctors have been finding it useful in experimenting with cures for pneumonia and heart ailments and as an aid to anesthesia. More recently, it has been found helpful in treating asthma.

West Texas Fields

Bennett outpost indicates drilling rush will be deferred. Slaughter field in Hockley County extended two miles.

Midland, Texas.—The threat of an enlarged drilling program for the Bennett field, Yoakum County, on the strength of the 1¼-mile southeast production extension may be deferred since the outpost has not made a favorable showing on swabbing test. Shell Petroleum Corporation's J. M. Ruyts 1, SW NW NW Section 743, will provide the first major extension for the field, but will require nitro shot and acid to attain commercial production. Several days of swabbing averaged two barrels of fluid hourly, with the percentage of wash water reduced to a third of the volume. Fresh water was used for circulation in drilling the broken pay lime at 5080-5266 feet. The fluid level fills 200 feet. Ruyts 1 occupies a favorable structural position, as it is about level with nearest producers. John Mabee et al's Willard 1, mile southwest outpost, which is higher structurally, was drilling cement plugs from casing at 4850 feet, with the hole bottomed at 4940 feet. Top of solid lime was called at 4560 feet, or 1004 feet sub sea.

The test by Mabee et al is being watched as an initial step toward the linking of the Bennett and Wasson fields which are 4¾ miles apart. Such a possibility gained support when Humble Oil & Refining Company's Wooten 3, NW SW SE Section 865 near east central portion of the Wasson field, drilled to 5346 feet, or 1760 feet sub sea, for a flow of 30 barrels of pipe line oil hourly after using 1000 gallons of acid. It is the deepest well in the field proper, and missed the water table that has been encountered at higher levels on other leases to the northwest.

Harry Adams and Bradley's Crain-Ohio 1, C E½ SW NW W. T. Ry. Section 216, Block G, major outpost for the Seminole structure, Gaines County, logged top of anhydrite at 2200 feet, with an elevation of 3413 feet, and is 117 feet lower on this first marker than a producer two miles to the west. It is only 18 feet lower than a small producer on the east edge of the original producing area. Correlations place Adams et al's test on the east flank of the axis of the structure that extends northwest from Seminole. Amarada Petroleum Corporation is rigging up for Riley 2, north offset to a producer and diagonal offset to the northwest of the discovery.

Slaughter Extension

Efforts of the Texas Company to expand production in the Slaughter field, Hockley County, two miles westward were rewarded when its Mallett 1-B, Labor 1, League 52, flowed 179 barrels of oil initial through open tubing after deepening to 5035 feet and reacidizing. First saturation was logged at 4952 feet, with an elevation of 3569 feet. The company discovered this most northeasterly field in the basin and is confronted with a major drilling program during the next several years, although no pipe line connection has been definitely slated for the area.

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start a series of production tests this week on Swenson 1-B, northeastern Garza County wildcat, that logged favorable saturation at several levels in the lower Permian and the Pennsylvanian in filling an Ordovician-test obligation. Water was found in the Simpson and Ellenberger in drilling to 8104 feet. The hole was plugged back to 7400 feet before cementing 7⅝-inch pipe at the latter depth. Pipe will be perforated by stages. The company is credited with having supplemented its large checkerboard blocks in the area with new leases on about 57,000 acres in Kent County since drilling to the Ordovician.

Humble Oil & Refining Company is rigging up to fulfill a 6000-foot depth contract assumed early this year in acquiring lease on 466,500 acres of the Matador Land and Cattle Company's ranch land in Dickens, Motley, Cottle, Floyd and Crosby counties. This large block of acreage was taken when the northeastern portion of the Permian Basin staged a lease and royalty play on the strength of an Ordovician development based upon geophysics. Matador 1, C SW NE Section 26, Block 1, Shock & Arnold survey, is located in Dickens County, 6 miles northeast of Dickens.

The east flank of the Gulf-McElroy field, Crane-Upton County, contributed the largest producer in the district last week through completion of Gulf Oil Corporation's Crier-McElroy 35 for a potential of 4424 barrels of 32.4 gravity oil with 3,900,000 feet of gas. Lime pay was shot with 510 quarts of nitro at 2725-2888 feet. The potential was based upon the last 4 hours of a 6-hour test through 7-inch casing.

Great Western Producers, Inc.'s Holt 1, C NE NE Section 1, half mile west of a small producer in the Andrews County sector of the North Cowden field, filled 900 feet with oil and 300 feet with water after 110-quart nitro shot at 4450-76 feet. Salt water at 4478-79 feet was plugged off. Top of oil saturation was logged at 4458 feet, with an elevation of 3124 feet. The thin pay section will have a tendency to discourage development in the area.

WEST TEXAS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Andrews County (Fuhrman)—		
Fuhrman Pet. Corp., Ashton 1....	*	4529
Barnsdall Oil Co., Ford 4.....1488		4460
Andrews County (Wildcat)—		
H. C. Wheeler et al, Farmers State Bank 1	*	4615
Dickens County—		
J. F. Morrissey & Co., McMahon 1..	*	1050
Ector County (Foster)—		
Stanolind, E. F. Cowden 9-A 1364		4174
Sunray Oil Co.-York-Harper, Inc., Foster 5-D 382		4237
Ector County (Goldsmith)—		
American-Maracaibo Co., Scharbauer 8-A 953		4210
W. H. Dunning Jr. Estate, Slator 1 165		4290
Gulf, Goldsmith 134 1016		4265
Goldsmith 135 1424		4205
Shell, Scharbauer 7-A 700		4214
Ector County (Harper)—		
Honolulu Oil Corp.-W. A. Black, Cowden 8 631		4182
Shell, E. F. Cowden 1-B 519		4245
Ector County (Jordan)—		
Atlantic, University 6-B 1601		3650
Ector County (North Cowden)—		
Tide Water Associated-Atlantic, Holt 4-C 1750		4363
Fisher County (Rotan)—		
Montour Prod. Co., W. L. Barker 2 345		3555
Fisher County (Wildcat)—		
Daube Bros. et al, Bennett 1-A...	*	3698
Gaines County (Wasson)—		
A. G. Carter et al, Wasson 2-D....1128		4989
Hockley County (Slaughter)—		
Snowden-McSweeney Co., Slaughter 1	*	5097
Howard County—		
Merrick-Murphy & Lamb, Chalk 3-B 1522		2949
Parten & Strickland, O'Daniel 1 (w)	*	2805
Jones County—		
Iron Mt. Oil Co.-Humble, Jones-Stasney-Bowden 7 2880		3244
Pecos County (Masterson)—		
W. H. Street et al, Shearer-Texas Co. 5 483		1452
Pecos County (Pecos Valley)—		
Superior Oil Corp., Iowa Realty Co. 4 78		1660
Pecos County (Wildcat)—		
Humble, A. H. Robertson 1.....	*	5368
J. G. Kugle-Sunset Oil Co., Jackson 2	*	2111
Scurry County (Wildcat)—		
Coffield-Guthrie, Inc., Spears 1.... 89		3543
Taylor County (Wildcat)—		
E. C. Lawson et al, D. E. Bell 1..	*	2360
Upton County (McCamey)—		
Anderson-Prichard Oil Corp., Elder 3 1141		2223
Basin Oil Prop., Inc., Baker 5-D..1095		2315
Ward County—		
Gulf, Hutchings 115 376		2760
Winkler County (Kermit)—		
Humble-Tide Water, Walton 16-D 226		2990
Magnolia, Walton 195 1748		2879
Winkler County (Keystone)—		
J. R. Sharp et al, Walton-Empire 5	†	915
Yoakum County (Wasson)—		
Humble, H. O. Wooten 2..... 461		5045
Shell, H. L. Lowe 7 724		5155
The Texas Co., E. Keller 1..... 253		5115
A. Miller 1-B 353		5070
H. O. Wooten 2 438		5050
H. O. Wooten 3 500		5056

*Failures; †Junked; ¶Million cu. ft. gas.

Jones County discovery well has good flow

Abilene, Texas.—A natural flow of 543 barrels of 41.6 gravity oil in 14 hours was credited to the second Palo Pinto lime strike made in northeastern Jones County. Ungren-Frazier et al's J. M. Griffin 1, NWc N½ SW BBB&C Section 199, half-mile east of Avoca, provided the discovery. The gauge was taken through open tubing, with 150 pounds back pressure on the tubing and 600 pounds pressure on the casing. Production is from sandy-lime at 3247-50 feet, with 5-3/16-inch pipe cemented at 3233 feet. Griffin 1 is 2 miles southwest of the Avoca field, which produces from the Palo Pinto member of the Canyon at the same level, but a structurally-low dry hole in between the two areas precludes a hookup.

J. G. Hammond, Inc. and E. C. Lawson's Mansker 1, northeast outpost for the Ivy pool, northwestern Shackelford County Palo Pinto lime area, logged top of Ellenberger at 5058 feet, and shut down after developing hole full of sulphur water at 5220-22 feet.

Fox, Rudd et al's Shotwell 1, southwestern Shackelford County outpost for the Hamby pool, which originated in Jones County, flowed 12 barrels oil hourly natural with tools in the hole from sand at 1620-32 feet. It showed for a small pumper in the upper pay at 1589-94 feet, then cemented pipe at 1619 feet.

Haskell County has two additional tests that are seeking production in the deep lime. Forest Development Corporation's Pardue 3, a failure in the Adams Branch zone for the Pardue pool, was drilling at 4800 feet. Roeser-Pendleton, Inc. and I. T. I. O. Co.'s Daugherty 1, wildcat 3½ miles northwest of Rule, tested dry in the Palo Pinto, topped at 4310 feet, and was drilling at 4740 feet.

TEXAS PANHANDLE

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Carson County—		
L. R. Hagy, Marsh-Harrington, Witter 2 ..... ¶13		2756
Northern Nat'l Gas Co., M. Thompson 1 ..... ¶8		2940
C. M. Smith et al, Percival 1.....¶70½		2699
Texoma Nat'l Gas Co., Witter 1-E.¶13.1		2770
United Crude Oil Co., E. Cooper 5-A 761		3202
Gray County—		
Bradshaw O&G Co., Sackett 7.... 422		3305
Geo. Dyer et al, Benton 1-a..... 371		3295
Hutchinson County—		
J. G. Burch et al, Herring 2..... 20		3182
Phillips Pet., Cockrell 35..... 365		3056
Thompson 9 151		3164
Cy Rieger et al, Hodges 3-B..... 542		3057
Moore County—		
Phillips Pet., Mills 1 .....¶39½		3265

*Failures; †Junked; ¶Million cu. ft. gas.

Panhandle Ordovician test in granite wash

Amarillo, Texas.—An unusually thick and hard packed section of granite wash has been encountered by the Sinclair Prairie Oil Company and Parcomis Oil Company's W. H. Bush 1, C SW SE BS&F Section 23, Block 6, Potter County, a projected Ordovician test for the Cliffside helium gas producing structure. Top of granite wash was logged at 5054 feet, with an elevation of 3428 feet, and this formation continued to 5274 feet, the latest drilling depth.

Bush 1 is the first attempt for deep production on the south flank of the Panhandle buried ridge. It is situated within the helium gas reserve owned by the United States Government. Extra precautions were taken to protect the regular gas zones, and 10¾-inch pipe was cemented below the gas pay at 3634 feet. The partnership owns the oil rights under about 20,000 acres that supports their deep test.

Service stations for boats

Many a couple that middle-aisled it last June scandalized relatives by asking for a boat instead of a rug for a wedding present. Old folks who recovered from the shock have decided perhaps the young idea was right, after all.

Anyway, thousands have been amazed to learn how easy it is to go places by waterway, whether harbor, sound, river, lake, or coast. In fact, they've found that the same folks who have made highway travel more comfortable, the service station men, already had organized the world of water travel.

Boat owners have their floating service stations, "road maps," used-boat exchanges, and all the other necessities. They warp into a dock, get "service with a smile," just like on land. They can anchor for an hour, a day, or a season in a city-owned "marina," or "boat parking lot," and they can even tie up at a water-trailer camp and have electric, telephone, and water service run right into the boat!

The cruise-minded follow the first inland waterway, which parallels the Atlantic Coast from Manasquam Inlet, New Jersey, around Florida, and along the Gulf Coast shore. It's well-marked, just like a modern highway, and fitted with everything the amateur mariner needs, including smooth sailing.

East Texas Fields

Navarro Crossing's latest completion is its best well. Transporting gas to East Texas field proves successful.

Palestine, Texas.—The Navarro Crossing field, northwestern Houston Woodbine strike made last March, recorded its best oil well when Humble Oil & Refining Company's Henry Dailey 1-B, on 68-acre lease, J. G. Thompson Survey, gauged 138 barrels of 34.6 gravity oil initial through ⅛-inch choke. Production is from Woodbine at 5872-79 feet, with an elevation of 254 feet. The gas/oil ratio was rated at 950/1. Working pressure on tubing was 1590 pounds, and closed pressure on casing was 2300 pounds. No water was reported. Four previous oil wells encountered water, and also produced considerable gas with the oil. Two wells were completed as big gassers, and one was a failure. The oil production is trucked to Humble Pipe Line Company's Todd station on its East Texas-Baytown carrier.

J. L. Collins, Wm. Steward et al's Hill 1, eastern Freestone County wildcat, found salt water in the Woodbine at 5151-60 feet, with an elevation of 322 feet, and is to be deepened for geological information. John G. Mayo et al's Lively 1, Houston County wildcat and 4 miles northeast of Grapeland, logged top of Austin chalk at 5480 feet, with an elevation of 383 feet, and was drilling chalk at 5810 feet.

Tide Water Associated Oil Company et al's McGee 1, third lower Trinity project for the Opelika pool, Henderson County, was checking higher structurally than the discovery 1¼ miles to the southeast, and was drilling at 3770 feet. Pecan chalk was logged at 2585-2822 feet, and top of Austin chalk at 3731 feet, with an elevation of 424 feet. The partnership's McElreath-Suggett 2-C, gas-distillate producer, is yielding from 75 to 100 barrels of distillate daily at gas trap in supply fuel for the contractor's steam rig used on McGee 1. This distillate is being sold to a Houston broker for 90 cents per barrel, and is loaded into tank cars at Opelika. The 25-barrel daily oil from the partially junked discovery, is trucked to Humble Pipe Line Company's Mildred station in the Corsicana-Powell field.

EAST TEXAS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Joiner Area—		
Humble, W. A. Mulliken 25 (166.4-ac)	7000	3715
J. E. B. Sneed 10 (104.7-ac)	8500	3773
Ohio Oil Co., DeGuerin 25 (160.7-ac)	2400	3661
Shell, H. Brooks 23-A (174.69-ac)	1500	3758
Stanolind, Milstead 18 (84.22-ac)	2400	3745
Kilgore Area—		
Devonian Oil Co., Motley 44 (442.1-ac)	6000	3677
Gulf, H. C. Alexander 36 (209.01-ac)	7500	3531
Ed. D. Markham et al, A. L. Still 1-B (96-ac)	120	3533
Overton Ref. Co., Florence 2 (49/100-ac)	500	3560
Longview Area—		
Atlantic Ref. Co., I. Walker 19 (123½-ac)	4500	3738
I. Walker 20 (123½-ac)	5000	3792
Gen'l Crude Oil Co., McGrede 4 (16-ac)	7200	3631
McGrede 5 (16-ac)	6500	3620
Humble, A. O. Phillips 13 (82¾-ac)	2600	3699
M. Wells 11 (69½-ac)	2500	3680
Magnolia, H. L. Foster 19 (101.41-ac)	9200	3608
P. H. Pewitt et al, T. J. Kirk 7, (34-ac)	*	3742
B. F. Phillips et al, L. J. Everett 9 (80-ac)	1200	3608
Shell, G. Jones 12 (43.52-ac)	8000	3598
B. Moore 14 (50-ac)	8400	3605
Angus Spear et al, McGrede 4 (10-ac)	7600	3635
Stanolind-Falcon Co., Cloud 7 (36.24-ac)	4000	3684
Angelina County—		
Ginter Co., Copes Hrs. 4	*	2214
Anderson County (Cayuga)—		
Tide Water Assoc.-Seaboard, Goode 8 (133.2-ac)	¶85	4026
Cherokee County (Lone Star)—		
J. R. Bunn-Chapman Minerals Corp., Bounds 2 (128-ac)	2	4085
Madison County—		
W. E. Holleman, Tr., D. C. Cannon 1	*	1740
Marion (Jefferson Rodessa)—		
Ark. La. Gas Co., Braden B-1, Duvall sur	¶25	5995
Fohs Oil Co., Davis 1, Smith sur.	125	6032

*Failures; †Junked; ¶Million cu. ft. gas.

Transported high-pressure gas success in big field

Tyler, Texas. — Transportation of high-pressure gas into the East Texas field for the purpose of gas-lifting production has been proved a success by recent experiments, and plans are underway for expanding the system.

Hunt Production Company is moving gas from its 2770-pound well at Chapel Hill, 16 miles from the edge of the East Texas field, to a group of 10 wells in the vicinity of Wright City. The line, half of which is 6⅝ inches in diameter and the remainder 5 inches, passes south from Overton through field to Wright City. Pipe was being unloaded today to extend the line north from Overton. This is one of the highest pressure lines in existence. When tested at 1000 pounds for 48 hours it showed but two small pin holes. It will carry 30,000,000 to 40,000,000 cubic feet of gas daily, depending upon the pressure, which is sufficient to handle many wells.

The economy of the plan has been proved by results made on the group of 10 wells. The average ratio has been but 300 cubic feet per barrel. From 5 to 8 gas-lift valves are installed in the well, which make it handle like a natural flowing well. Three hundred and fifty pounds have been found ample for gas-lifting East Texas wells, but Hunt

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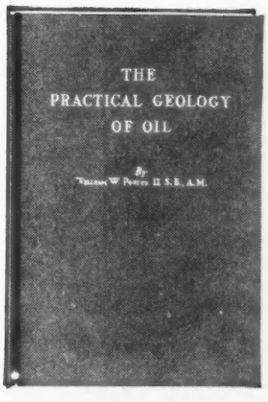

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Drilling still active in East Texas field

Kilgore, Texas. — The accumulation of wells without a market outlet in the East Texas field has not curbed the drilling of inside locations. The current report on field work is at the highest level attained in 5 weeks, and scheduled tests indicate that a large quota of wells will be added before the end of the year. There are 27 rigs running, including 15 on leases owned by the majors, with a total of 64 operations listed. Majors contributed 14 of the 21 producers added the past week.

No special effort has been made to defer this drilling. However, applications for drilling permits that involve exceptions to the spacing rules have been denied in greater numbers than those approved by the Railroad Commission in recent months.

Texas drilling permits

The Texas Railroad Commission last week approved permits for drilling 202 new wells in Texas, 86 more than were allowed the week before.

One location was approved in the East Texas field, in Gregg County, while 13 locations were reported from Cooke County in East Central Texas.

Permits for drilling 98 wells in North Texas were reported, including 40 in Wichita, 25 in Archer, 13 in Clay and 10 in Jack County. Three permits were granted to operators in the Panhandle.

There were 30 locations approved in Southwest Texas, including 15 in Duval County. Gulf Coast operators reported 27 new locations.

The commission approved 12 permits in West Texas, while 18 were listed in West Central Texas.

Junction pool well yielding some oil

San Antonio, Tex. — Plateau Oil Company's Hunger 1, nearly a mile north of the discovery well of the Junction pool in Kimble County, late last week was still cleaning out and testing at 1837 feet. The well was shot with 120 quarts between 1790-1835 feet and has been making a little 37 gravity oil.

In Kerr County, J. O. Hart and Sons and H. H. Howell were continuing to clean out Jeff E. Love 6 (5-E) Section 1594 and on the Love Ranch prospect. It is bottomed at 5625 feet in the Ellenberger.

Oklahoma lease sale

Osage oil and gas leases on 12,517 acres will be offered to the public at Osage Auditorium, Pawhuska Oklahoma, at 10:00 a.m., December 6. Lands offered are confined to the Osage area and consist of 79 tracts, all being complete quarter sections with a single exception.

Southwest Texas Fields

New producing sands are found in Corpus Christi area. Frio County wildcat encounters oil showing in Edwards. Deep well proves McAllen as important producing area.

Corpus Christi, Tex.—The South Texas Gulf Coast's field expansion program netted more producing sands plus several probable oil fields during the past week. While wildcatting has shown a decline, not let-up has been indicated in number of successes.

Pure Oil Company et el's State of Texas 1 was attempting completion in the Frio zone below 7200 feet after finding an oil and gas sand at that level. The well is in the eastern portion of State tract 522, one mile west of north Bird Island and 10 miles south of Flour Bluff in Laguna Madre. The well is on a block of 4800 acres held jointly by the Pure and Superior Oil Corporation.

The test had been drilled to 9636 feet. Perforations were made at 7250-57 and 7270-80 feet with 75 shots after the hole had been plugged back to 7380 feet. It gives promise of establishing an entirely new producing area for Kleberg County.

East Premont Field

In adjoining Jim Wells County, two new sands were proved and extensions were provided to the East Premont field. Transwestern Oil Company's Dunlap 1, Section 181, 6000 feet southwest of production, flowed two barrels of 60 gravity distillate per hour through ¼-inch choke under pressures of 2000 pounds on tubing and 1975 pounds on casing. Lack of a vapor proof type of storage prevented an accurate gauge. The well is bottomed at 6766 feet but it was plugged back and perforated at 5365-70 feet with 24 shots. The regular 6600-foot producing zone was shaley. Magnolia Petroleum Company's A. A. Seeligson 10, in the main field, made a distillate producer in the regular 6600-foot pay, plugged back and made a distillate well in a new zone through perforations at 6132-38 feet. Another production test through perforations in a new sand netted 102.86 barrels of distillate in 24 hours through ⅜-inch choke under pressures of 2200 and 2400 pounds. This completion was through perforations at 5807-12 feet. The test was plugged back in an effort to open a 5600-foot sand.

Alice Field, also in Jim Wells County, had a series of sands being extended by producers immediately adjacent to production in their respective levels.

La Rosa Extension

Refugio County's new La Rosa Field was in the process of being extended 4000 feet to the southwest with Mrs. B. D. Rooke 1, Section 6, coring the discovery sand at 5397-5405 feet and running a drill stem test.

Several deep wells along the trend are at interesting depths. Union Producing Company's Minnie Brown 1, at Agua Dulce, Nueces County, was near 12,500 feet, still in shale, while Hiawatha Oil & Gas Company's Roemer 2, near Seadrift in Calhoun County, was below 9500 feet.

On the Riverside prospect, Stanolind Oil and Gas Company's George Clark 1, was below 5390 feet, having passed through gas sands at 4881-92 feet and 4993-5003 feet. Seaboard Oil Corporation of Delaware's Ellen C. Wilson 1, 3000 feet farther northwest was below 5500, having encountered gas sand at 4213-24 feet, distillate sand 4827-53 feet, oil sand 4937-45 feet and gas sand 5242-53 feet. These two Nueces County wildcats are on one of the most important geophysical prospects drilled in several years.

McAllen is expected to cover 6000 acres

McAllen, Tex.—Storage was full at R. E. Harding et al's E. M. Card 1, discovery well of a new deeper sand in the McAllen field, Hidalgo County. The test definitely proves this huge structure as a potentially important distillate producing area, expected to cover up to 6,000 acres.

The test, located in the northeast corner of Lot 8, Block 8, Hidalgo County Canal Company subdivision, is 2 miles west and one mile north of the discovery producer and is ½ mile east of the city limits of McAllen. It logged sand 7402-98 feet, went to 7507 feet, and has been finished through perforations at 7440-65 feet, where 60 shots were made. It flowed 92 barrels of 55 gravity distillate along with 18 barrels of fresh water per day through ⅜-inch choke under pressures of 2200 pounds on tubing and 2800 pounds on casing. The gas volume was estimated at 8,600,000 cubic feet per day, making the gas/oil ratio 95,650 cubic feet to the barrel. Back pressure on the separator was 475 pounds and closed in pressure on the tubing was 3100 pounds.

Gasoline Plant Rumored

Rumors are that the Phillips Petroleum Company, which has either acquired leases or has option to acquire leases on some 15,000 acres, including the Harding properties, will construct a natural gasoline plant and other facilities in the area. The company is at this time working out plans for wide spacing and prevention of waste in the sector.

Two deep wildcats are projected for Willacy County. Temple Hargrove has acquired leases and is planning a well about one location east of the La Sal Vieja prospect, producing from below 7600 feet. The discovery well was abandoned after making salt water. Pure Oil Company took part of Sal Vieja Oil Corporation's block and plans a test. Both wells will go to 8000 feet, or production.

The Sun-Kelsey Bass trend through

Starr and Jim Hogg counties retains prime interest in South Texas. Humble Oil & Refining Company's Kelsey Bass 3, 3732 feet north of the discovery of the Bass field, showed for an excellent producer in the discovery sand, but drilled ahead. It logged gas sand 4713-20 feet, shale and sand 4723-32 feet, oil sand 4732-35 feet. Another sand was found 4760-66 feet and still another at 4784-4803 feet, both of which carried good oil show. The hole was carried to 4882 feet, showing sand and shale section. A drill stem test at 4770-4882 feet recovered 1050 feet of salt water, 250 feet of mud, and a good gas blow in 20 minutes. It was waiting on orders, expected to drill ahead.

Sun Field Active

Sun field, Starr county, had a series of interesting sands. Circle Oil Company's Olivares 1, 4000 feet north of the discovery and only producer, showed for a gas producer in sand topped at 4553 feet when a test was made at 4550-59 feet. Another test at 4560-74 feet showed for an excellent oil well. Still another test was made at 4867-81 feet, recovering 500 feet of oil, 100 feet of brackish water and 40 pounds pressure in 7 minutes. A new drill stem test was being run of oil sand 4903-21 feet.

Sun Oil Company's Olivares 1, ¾-mile northwest of the discovery, drilled to 5709 feet, bottomed in salt water sand, plugged back, and was completing through perforations in sand 4890-4911 feet. Sun Oil Company has two more locations in the area.

In the Samfordyce field, Hidalgo County, Phillips Petroleum Company drilled to below 9700 feet, apparently in the Cockfield, and was shut down for orders. The well is Flores 1, first deep test in the field.

SOUTH TEXAS

Completions

SAN ANTONIO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Bexar County—		
Ridder, Ridder 1, Barrera sur, 2 mi e McDonna	*	245
Caldwell County—		
Martell, Gray 3, Salt Flats	53	2697
Wright 11, Salt Flats	70	2664

CORPUS CHRISTI DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
De Witt County—		
Howeth, Albrecht 1, 7½ mi s Nordheim	*	4360
Hidalgo County—		
Harding, Card 1, ½ mi e McAllen (perf 7440-65 ft)	¶8 & 96	7507
Weekley, Guerra 1-D, Samfordyce (perf 2900-11 ft)	350	3063
Jim Wells County—		
Howell, Lindsay & Reed 21, Alice (perf 5308-15 ft)	600	6415
Live Oak County—		
Ohio Fuel, McGriff 1, Oakville	¶3	2814
Stewart, Nations 2, 2 mi n Ezzell Field	*	1490
Nueces County—		
Conservative, Flinn 2, S. Clara Driscoll	600	5440
Corpus Christi, Wardner 6, Stratton	450	6431
Seaboard, Luby (James) 14, Luby	575	5175
Stanolind, Spessard 17, Luby	400	5068
Refugio County—		
Copano, O'Connor 34-B, Tomoconnor	1500	5884
O'Connor 23-B, Tomoconnor	1500	5925
San Patricio County—		
Plymouth, Welder 106-C, Plymouth	500	5885
Texon, Rambo 2, Plymouth	600	5643
Victoria County—		
Barnsdall, McFaddin 9, McFaddin	450	4392
McFaddin 10, McFaddin	450	4391
Stanolind, Henderson & Pickering 5, Ne. Placedo	*	7020

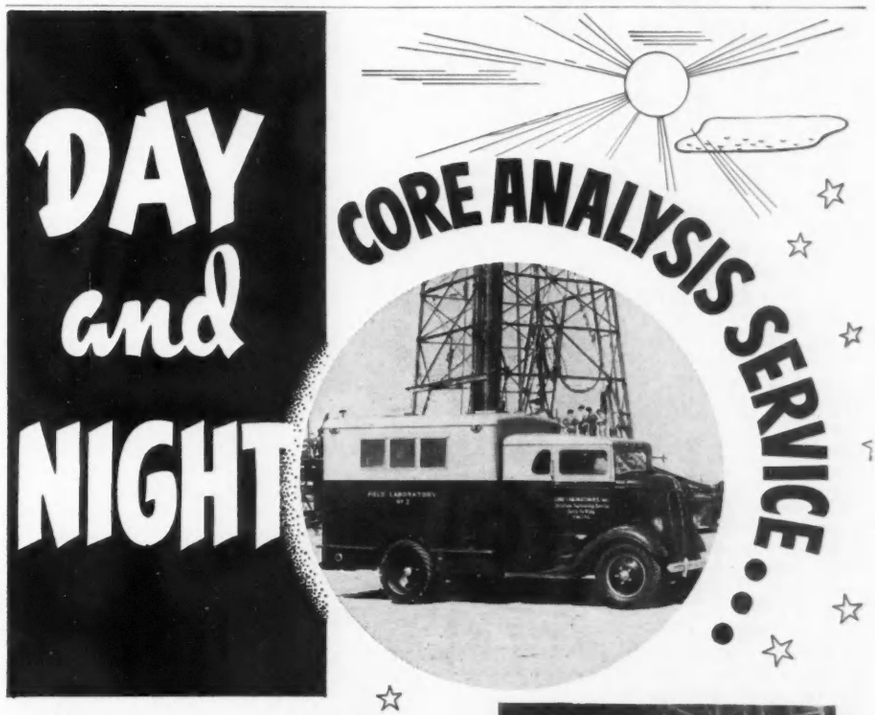
LAREDO DISTRICT

Company, Well and Location	Init. Prod. Bbls.	Depth
Duval County—		
Amerada, Fitzsimmons 1, Fitzsimmons	850	4354
Buchanan, Duval 5, sec 206, Eagle Hill	132	1521
Cox & Hamon & Gorman-Yoakam, Cuellar-Hagan 7, Hoffman	58	2804
Cuellar-Points 8, Hoffman	55	2815
Duval, Hoffman 12, Hoffman	75	2867
Frohnhoefer, Fitzsimmons 2, Fitzsimmons	400	4364
Hiawatha, Southland 12, N. Sweden	*	6200
Humble, Moyer 3, N. Sweden	275	5361
McCallum & Forber, Gruy 2, Rancho Solo	*	1843
Porter, Fitzsimmons 7-A, Fitzsimmons	750	4320
Porter & Wheelock & Collins, Driscoll 6, Fitzsimmons	550	4407
Rowan & Hope & Hagan-Stewart, Cuellar 1, Hoffman	240	2813
Cuellar 1-A, Hoffman	250	2723
Stewart-Nye & McKenzie, Peters 1-A, Rancho Solo	75	1892
Thompson, Parr 1, 2½ mi s Fitzsimmons Field	*	5815
Transwestern, Duval 13, sec 294, Casa Blanca	46	1182
Starr County—		
Davis, Garza 2, Barbacoas	*	3014
Dodd, Wood 6, S. Ricaby	123	1786
Webb County—		
Holland, Bruni 1, Borrego grant	*	1628
Killam, Frost 1, 10 mi s Aguilares	*	2467
Mayfair, Bruni 1, Borrego grant	*	1609
Zapata County—		
Dulup, Trevino 39 (39), Escobas	5	1207
Gilcrease, Haynes 38-B, Comitas	42	....
Haynes 39-B, Comitas	37	1123
Texas, Jennings 123, Escobas	50	1298

*Failures; †Junked; ¶Million cu. ft. gas.

Cook Mountain pay promised in Goliad

Beeville, Tex.—Steinberger Petroleum Corporation is experiencing considerable trouble in completing its deep test in the Weser field of Goliad County. Albrecht 1, T. Hancock Survey, swabbed a little oil and mud through



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new perforations at 5238-45 feet, but failed to flow. Screen was pulled and a new set of perforations made at the same level. The well is expected to be completed over the week end. If completed as a commercial producer, it will be the first producer in the Cook Mountain formation in the Pettus district.

In the Beeville area, Bee County, Chapman Minerals Corporation was drilling plugs and preparing to core deeper into the sand in Ablinger 1. The well found a hard sand cap with gas odor at 5938½-41 feet and set 4½-inch casing on bottom. The well, in John Ryan Survey, is 200 feet southeast of an old test drilled by Lonnie Glasscock on the same tract. The showing is in the Cockfield.

Edwards lime showing makes area look good

San Antonio, Tex.—Finding a good oil showing in the Edwards limestone topped at 5218½ feet, Humble Oil & Refining Company's Marrs McLean (Houston) 1, newest test on the Shattel prospect in Frio County, indicates a new field of considerable importance for South Texas. The well is 1713 feet north of Schley 1, an Austin chalk producer which is classified as the discovery well of the district.

A drill-stem test at 5222 feet recovered 90 feet of oil and mud, about 6 percent of which was free oil, 180 feet of salt water and 40 pounds pressure in 15 minutes. A second test was made at 5226 feet, where the test showed 130 feet of oil and mud with 190 feet of salt water and 40 pounds pressure in a similar period. The well was cored ahead to approximately 5241 feet, where a third drill-stem test was reported. No details were available.

This new test is located 1033 feet from the south line and 668 feet from the west line of the Michael Ripps Survey No. 162. It is on a block of approximately 20,000 acres held by the Humble Oil & Refining Company upon which it did several kinds of geological and geophysical work.

This concern's first test, Schley 1, found the top of the Edwards limestone at approximately 5300 feet, drilled to 5390 feet, tested sulphur water, plugged back to 4800 feet, then pumped at the rate of 21 barrels of fluid per day, 55 percent salt water. The pumping tests ranged from 4 to 5½ hours per day. Production is from the Austin chalk topped at 4685 feet.

Teas, Ashley & Tinton's Grizzard 1, A. Graham League, nine miles south of Smithville, Bastrop County, is due for another production attempt. Casing was being perforated between 7023-30 feet in the upper portion of the Edwards limestone. The well is bottomed at 7717 feet, the lower section carrying salt water.

North Sweden deep test unsuccessful

San Diego, Tex.—An attempt to uncover new sands below the regular zones in the North Sweden field failed when the Hiawatha Oil and Gas Company abandoned Southland Life Insurance Company 12, Block 10, at 6200 feet. The test had a series of sands below the present deepest level of 5400 feet, but drill stem tests failed to indicate commercial production.

Texas Gulf Coast

Jefferson County strike may be field or Cheek extension. Mt. Houston's wildcat blowout from unknown formation. Iowa Colony test is running higher than previous failure.

Houston.—About one mile west of the Cheek field, Jefferson County, Humble Oil & Refining Company made a drill stem test on Todd 1, William Carr Survey, and showed commercial oil. Seven-inch casing has been set for a production test. There has been some debate whether this well will open a new oil field or extend Cheek. It was drilled to 7719 feet in oil sand topped at 7716 feet. A 10-minute drill-stem test from 7675 to 7719 feet through ¼-inch chokes showed 1800 feet of 35-gravity oil and 100 pounds pressure, no salt water. Casing has been set at bottom. An earlier drill-stem test from 7657 to 7660 feet showed 90 feet of mud, sand and salt water in 20 minutes through ¼-inch chokes.

Jack Frazier's Griffith 1 on the Mt. Houston prospect, Harris County, attracted attention when it blew out at 7760 feet, mud going over the thribble board. Griffith 1, Adams Smith Survey, topped the Cockfield at 7620 feet. When coming out of the hole, with 20 stands out, the well started blowing mud and showing gas. It was brought under control after it had bridged. The bridge was drilled out and cores taken down to 7828 feet showed no sands. It is believed that the gas sands were up the hole. The wildcat is reported to be running over 100 feet high on geological markers.

In the Iowa Colony area, Brazoria County, Humble Oil & Refining Company's Tuttle 1, HT&B No. 67, was running over 400 feet higher than Normandie Oil Company's Ramsey 1, one mile northwest, on the Frio sand. However, Tuttle 1 cored 15 feet of clean salt water sand from 5954 to 5969 feet. The hole is bottomed at 6053 feet and an electrical log was run. Hole will be carried deeper to test the lower Frio sands which carried salt water in Ramsey 1, but with Tuttle 1 high on structure, oil may be found. Iowa Colony is one of the more important prospects on the Texas Gulf Coast and has been worked with geophysics by several major companies. Humble Oil & Refining Company controls over 80 percent of the acreage. Tide Water Associated Oil Company, Sun Oil Company, Gulf Oil Corporation, and Magnolia Petroleum Company are other lease holders in the area.

Two and a half miles north and slightly west of the discovery well at League City, Galveston County, H. C. Cockburn's Haardt 1, S. F. Austin Survey, was drilling in shale below 8100 feet last week after logging salt water sands at 7649 feet, two feet after the top of the Frio formation was picked up. Other salt water sands were cored from 7784 to 7793 feet and from 7719 to 7724 feet. Haardt 1 is running higher than the discovery well on structure, having topped the Frio at 7647 feet and the Heterostegina at 6833 feet. Phillips Petroleum Company has made location for Patton 1, 466 feet west of the east line and 400 feet south of the north line of the south 200-acres of the Patton 300-acre lease, 5350 feet northeast of the discovery well.

Northwest of Conroe, Montgomery County, Housh & Thompson's Clary 1, W. S. Allen Survey is still shut down at 4739 feet to cure titles. This potential discovery well set seven-inch casing after a drill-stem test from 4736 to 4739 feet showed 41.8 gravity oil.

North of Louise in Wharton County, Crown Central Petroleum Corporation's Babcock 1, S. P. Middleton Survey, was drilling in shale at 4450 feet at the close of the week after coring salt water sands in Frio formation. Sands were cored at 4010 feet and 6 feet of clean salt water sand was cored from 4431 to 4437 feet.

Southwest of production at Palacios, Matagorda County, Glenn H. McCarthy abandoned Herman 1, which drilled to 9007 feet in sand and shale which carried gas and salt water. Salt water sands were topped around 8995 feet and the well tried to blow out.

On the southeast flank of West Columbia field, Brazoria County, General Crude Oil Company's Campbell Estate 1,

TEXAS GULF COAST
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Anahuac—		
Humble, Johnson 25	728	7145
Boling—		
Mackhank Oil Co., J. R. Farmer C-9	298	4577
Cotton Lake—		
Humble, N. Howard 3	*	6644
Dickinson—		
Humble, Wilkinson 1	*	8277
Eureka —		
Tide Water, Ford 1	*	8113
Fairbanks—		
Amerada-Stanolind, Louis 1	340	6843
Bridwell Oil & Gas Co., Bibson 1	188	6869
Housh & Thompson, Baines 1	*	7362
Noble & Baker, Hillegeist 1	649	6852
Friendswood—		
Humble, Grey 15	605	6037
Kiesling & Dixon 7	600	6046
Hardin—		
Humble, Partlow A-5	462	7610
Hastings—		
Humble, Shindler 12	598	6072
Stanolind, Resoft 2	593	6080
Roberts 5	528	6080
Humble—		
Newton-Simms Oil Co., Hirsch 3	241	1074
Hull—		
Houston Oil, Fee 1	290	4826
Hurley & Mecom, Merchant B-2	352	4538
Mecom, Beers 7	50	3285
Magnet—		
Wolf & Grey, State 2	82	5536
Old Ocean—		
Harrison & Abercrombie, Fidelity Oil Co. 1	365	10,125
Fisher-Larson 1	338	10,190
Orange—		
Gulf, LaFlour et al 1	129	5959
Palacios—		
Glenn H. McCarthy, Herman 1	*	9007
South Bay City—		
Hamman Expl. Co., Crooker 3	190	9100
Thompson—		
Humble, Lockwood-Sharp A-X-42	¶5	3750
Tomball—		
Humble, Faris 8	63	5561
Keuhn 8	445	5557
Shell, Rudal 2	489	5579
Chambers County—		
F. A. Gillispie, Kirby Pet. Co. 1, Chambers County School Land sur West Cotton Lake area	*	6523

*Failures; †Junked; ¶Million cu. ft. gas.

J. H. Bell Survey, was coring in salt water sands at the end of the week at 6385 feet. The hole will be carried deeper and then plugged back.

South of production at Sandy Point, Brazoria County, Stanolind Oil & Gas Company missed the pay horizon in Sharp 1 and is drilling at 7200 feet in shale and lime. The hole will be drilled to 8000 feet.

Southwest of production at Eureka, Harris County, Tide Water Associated Oil Company abandoned Ford 1 at 8113 feet in water sands after plugging back and making a series of drill-stem tests. The last test was from 7712 to 7730 feet where 230 feet of salt water and a scum of oil was recovered in 30 minutes.

On the south flank of South Houston, Harris County, Smith & McDannald's Molk 1 was drilling in shale at 5300 feet last week after coring salt water sands at 5164 feet in Frio formation.

About 1800 feet southeast of production at Orange, J. G. Mayo et al's Scales 1 cored oil sand and is setting casing for a production test. The sand was logged at 6170 to 6178 feet. Seven-inch casing is being set on bottom at 6178 feet.

Shell Petroleum Corporation made a drill-stem test on McFaddin 3 at Clam Lake, Jefferson County, and recovered oil and salt water. Casing was perforated from 5955 to 5965 feet and the packer was set at 5945 feet. The testing tool was opened 10 minutes and the well showed a 2700 pounds pressure. The crew recovered one barrel of mud, 3½ barrels of 34.6 gravity oil, 6½ barrels of oil and brackish water and 1¼ barrels of salt water. The well is shut down waiting on orders.

Union Producing Company's Warneke 1, offset to Stanolind Oil & Gas Company's Look 1, which extended the Fairbanks field, Harris County, some time ago, cored gas sand from 6779 to 6812 feet and oil sand from 6812 to 6836 feet. Casing is being set for a production test. Look 1 was completed in a deeper sand.

A mile south of production at Turtle Bay, Chambers County, Stanolind Oil & Gas Company's State 1-35 is drilling in shale below 7330 feet after coring salt water sands in Frio formations. The company will drill to below 8500 feet to test lower formations.

SOUTH LOUISIANA
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Bancroft—		
Republic, Lutcher Moore 2	310	7370
Charenton—		
Commerce Oil Co., Parro 2	552	6705
East Hackberry—		
Gulf, Erwin 24	66	3205
Darrow—		
Humble, Community B-2	*	7692
Gueydan—		
Buckley et al, Mulvey Irrigation Co. 1	*	4801
Jennings—		
Frio Pet. Co., Iowa-Jennings 1	*	7335
Raceland—		
Amerada-L. L. E. South Coast 2	*12,200	
Tide Water, South Coast 1, dr to 10,315 ft, pb & comp	125	7190
Venice—		
Tide Water, Buras Levee Board 2	300	3634
Avoyelles Parish—		
Magnolia, Bowden 1, Evergreen area, 7-2s-4e	*	9015
Beauregard Parish—		
Republic, Lutcher Moore 1, Mystic area, 14-7s-2w	*	8980
Terrebonne Parish—		
Shell, Peters 1, South Houma, dr to 11,054 ft, pb & com	444	10,308

*Failures; †Junked; ¶Million cu. ft. gas.

South Louisiana

Area's Sixteenth new field this year is at South Houma. New sands found productive at Venice and at Raceland.

Lake Charles.—A new Terrebonne Parish oil field was opened November 13 when Shell Petroleum Corporation completed Peters 2, South Houma prospect, Section 77-18s-18e. After perforating casing in Miocene sands at 10,300 to 10,308 feet, the wildcat flowed an estimated 18½ barrels of 36.9 gravity oil per hour, 2½ percent basic sediment and water, through a 11/64-inch choke. Tubing pressure was 3100 pounds and casing pressure 3300 pounds. Later the well was tested through various size chokes and it flowed 274 barrels of oil with a tubing pressure of 3300 pounds and a casing pressure of 3800 pounds. Peters 1 was drilled to 11,047 feet and plugged back to 10,343 feet after a short string of 5-inch casing was set. The casing was perforated in the producing sand with 40 shots. Two and half-inch tubing was hung at 10,263 feet.

South Houma is the sixteenth oil field to be discovered in South Louisiana this year. Shell Petroleum Corporation has been carrying on an active wildcat campaign in South Louisiana this year and are at present drilling several important wildcats.

On the Lake Verret prospect in St. Martin Parish, Shell Petroleum Corporation is preparing to make a drill-stem test on H. Burdin 1, Section 15-14s-12e. A broken formation with shows of oil was cored from 9464 to 9540 feet. One drill-stem test was attempted but the seat failed to hold. Another seat will be reamed and another test will be made.

Tide Water Associated Oil Company last week discovered two new sands, one at Raceland and the other at Venice. Probably the more important of the two is that at Venice, Plaquemines Parish, where 91 feet of saturated oil sand was tested in Buras Levee Board 2. The well came in flowing 250 barrels of 40.5 gravity oil in 20 hours through 3/16- and ¼-inch chokes from Miocene sands at 3634 feet. Tubing pressure was 400 pounds. Gas/oil ratio was 420 to 1. Buras Levee Board 2 was drilled to 3634 feet and 7-inch casing set at 3619 feet. The 3600-foot sand makes the third producing horizon for Venice. Tide Water Associated Oil Company holds 50 percent of the acreage in the area while Humble Oil & Refining Company and Gulf Oil Corporation have a quarter each.

At Raceland, Lafourche Parish, Tide Water Associated Oil Company's South Coast Corporation 1-A was completed in Miocene sands at 7174 to 7190 feet. This east extension well came in flowing an estimated 125 barrels of fluid, 80 percent oil and 20 percent wash-water, daily through a ⅛-inch choke. The well has not cleaned itself and is reported not making any salt water. Tubing pressure was 550 pounds and casing pressure 850 pounds. South Coast Corporation 1-A was drilled to 10,315 feet and plugged back to 7350 feet and 5½-inch casing was set at 7330 feet. This is the third producing horizon to be discovered at Raceland. The field is producing now from 7174 feet, 7250 feet, and below 10,000 feet.

Sun Oil Company has announced location for another well in the Chacahoula field, Lafourche Parish. Dibert, Starks & Brown 4 is 4464 feet south and 2032 feet east of NWc 70-15s-15e.

At Baton Rouge, East Baton Rouge Parish, William Helis is reworking Duplantier 3, Section 65-7s-1w, which came in the previous week to open a new sand. The well originally was completed at 6775 to 6778 feet when it flowed 400 barrels daily through various size chokes. It sanded up and screen is being pulled to reset.

The Texas Company is preparing to complete L. L. E. Lafitte 12, Section 20-17s-24e, Lafitte field, Jefferson Parish, at 10,145 feet where 7⅝-inch casing is set. Oil sands were cored from 10,025 to 10,045 feet. Broken oil shows were cored from 9960 feet to the bottom of the hole.

The Texas Company made another test on La Terre Company 1 at Golden Meadows, Section 1-20s-21e, last week and it failed to show anything of commercial importance. The casing was perforated with 10 shots from 9265 to 9290 feet and it failed to flow. Perforations have been squeezed with cement. This is the second test made on the wildcat, the first was at 10,000 feet where it showed 180 feet of distillate. The company is drilling in State Catfish Lake at Golden Meadows and has made location for Louisiana Land & Exploration Company 1 in Section 77-19s-21e. The Texas Company also made location for a wildcat on the Bastian Bay prospect in Plaquemines Parish, Bastain Bay-Louisiana Land & Exploration Company 1, Section 43-20s-28e.

North of production at Valentine, Lafourche Parish, William Helis is making a production test on Valentine Sugars 4, Section 2-17s-20e. The hole was drilled to 7567 feet in heaving shale and plugged back to 6755 feet. Sands from 6750 to 6760 feet will be tested.

The Texas Company has made location for a wildcat on the Paradis prospect in St. Charles Parish. It is northwest of Bayou Des Allemands field on Louisiana Land & Exploration Company acreage in Section 40-14s-20e.

Northwest of production at Villa Platte, Evangeline Parish, The Texas Company is preparing to make a production test on its first well in the area. It cored oil sands from 9115 to 9124 feet and set 6⅝-inch casing at 9072 feet. The lower portion of the oil sand had a salty taste.

Humble Oil & Refining Company announced location for a wildcat in Calcasieu Parish, S. A. Knapp 1, C NW SE 20-10s-8w.

In the Evergreen area, Avoyelles

Parish, Magnolia Petroleum Company's W. B. Bowden 1, Section 7-2s-4e, was abandoned at 9014 feet in shale. The wildcat drilled several hundred feet into the Wilcox formation and failed to find any oil sands. In the Sparta formation around 7593 feet it cored a slight show of oil. The company has announced location for another well at West Gueydan, Vermilion Parish, Adam Cormier 1, W½ E½ NW 5-12s-2w.

In St. Landry Parish, Herton Oil Company's Thistlewaite 1, Section 60-4s-4e, was shut down at 11,200 feet last week and may abandon at this depth. It is 265 feet in the Wilcox formation.

The Texas Company's second well at Bateman Lake, Wax Bayou Company 1, St. Mary Parish, made a production test after perforating casing with 33 holes from 10,937 to 10,948 feet and recovered salt water. The perforations have been squeezed with cement to perforate higher. Wax Bayou Company 1 is bottomed in shale at 11,175 feet and 7⅝-inch casing was set at 11,126 feet. The same operator's State Horseshoe Bayou 2 at Horseshoe Bayou, St. Mary Parish, was waiting on cement at 11,631 feet after running a long string of 9⅝-inch casing. State 2 is bottomed at 11,644 feet, below the established producing horizon.

Two new wildcat locations were made in St. Mary Parish last week. Peterson Petroleum Corporation made location for Green Estate 1 in Section 27-13s-9e and St. Mary Oil Company's L. Hebert 2 is in Section 31-13s-9e.

North Louisiana Fields

Shreveport extension is first well in city limits.

Third deep test is planned by Magnolia at Shongaloo.

Shreveport.—Another extension of the basal Glen Rose lime producing horizon in the Shreveport field and a set-back in first test made of that horizon in an operation 1½ miles south of production featured development in this district last week. Four new locations for the field were announced.

Rodessa Oil & Refining Company's Chandler 1, SW NE 34-18n-14w, was preparing to perforate casing set on bottom at 5590 feet, after the test logged 16 feet of saturated lime, electrical tester run and drill-stem tests made. This is the first test drilled in the city limits of Shreveport since discovery of the field July 15. Present test logged top of saturation at 5541 feet, 6 feet higher than the discovery well in Section 27-18n-14w.

Formation test from 5541 to 5546 feet in the first 5 feet of the Pettet horizon showed 255 feet of oil in 10 minutes through ¼-inch choke on bottom and ⅜-inch choke at the top, with 500 pounds pressure. The oil was 44 gravity at 72 degrees. A second test for the same length of time and similar chokes in the next 4 feet produced 50 pounds of pressure and 90 feet of oil and 90 feet of mud. Hole was then deepened 25 feet and 7-inch casing set on bottom at 5590 feet.

C. D. Loe and associates' Lionel Meyer 1, SE SW SE 33-18n-14w, showed salt water when tested through perforated casing at 5600-5627 feet. Test was then plugged back to 5611 feet and casing will be perforated above that. Top of Pettet lime was 5592 feet.

The four new locations announced in the Shreveport field last week are: George Ablon and R. R. Edmonson, R. Hayle 1, SW NW 20-18n-14w; Harry Hanbury, Loe 1, SE SW 23-18n-14w; R. E. Allison's Jones and Mabry 1, SW SE 21-18n-14w; and Allison's Ellerbe 3, SW NE 28-18n-14w.

Ten miles southeast of the Shreveport and believed on another structure, Arkansas Fuel Oil Company drilled at 4270 feet in shale and lime in F. F. Webb 1, C NW SW 4-16n-13w, Caddo Parish. Arkansas Fuel Oil Company was coring at 7146 feet in Davis B-1, SW NW SW 7-16n-4w, Bienville Parish, Driscoll district.

Magnolia Petroleum Company's Pardee Company C-1, C NW NE 17-23n-11w, geophysical prospect 3 miles north of the shallow Cartersville field, Webster Parish, drilled and cored below 9435 feet in shale and lime.

Lisbon Extended

Producing limits of the Lisbon field were extended one location east from the south edge of production when Magnolia Petroleum Company's Patton B-1, NE NW 13-20n-5w, was completed after acidization, flowing 45 barrels per hour for first 4 hours through ¼-inch choke and then being choked to 10 barrels per hour. Total depth is 5407 feet and 12 feet of saturation was logged. The south end of Lisbon has not yet been defined.

Northwest of production in Blue Lake (West Zwolle), Sabine Parish, Zwolle Syndicate was making a new test in Mansfield Hardwood 1, NE NE 8-7n-14w, following perforation of casing at 3862-68 feet. On a previous test a slight oil showing was found at 3860-86 feet.

A new gas producing horizon for the Dolet Hills or Grogan district, DeSoto Parish, was apparently found in J. A. Lanier's Jal 1, NW NE 5-11n-11w, which after being plugged back to 4038 feet from 4205 feet was tested at 3901 to 3920 showing estimated 25 million cubic feet of gas daily. The horizon is probably the Paluxy.

Oliphant Oil Company's Stewart B-1, C NW NE 5-20n-10w, southwest outpost at Cotton Valley, Webster Parish, was coring below 9175 feet after having cored 1½ feet of porous sand with an odor of gas and distillate from 9003 to 9009 feet in the Davis "F" sand. Also on the south flank of this dome, Mid-States Oil Corporation's Welori Lumber Company 1-A, NE NW 3-20n-10w, was cleaning into pits Thursday after casing was perforated from 8519 to 8523 feet in the "D" sand with sixty shots. It is an east offset to the same company's "D" sand crude oil producer. Hunt Oil Company's J. Sandifer 1, C NE NE 4-20n-10w, was waiting on cement after plugging back for another test of the lower Marine following appearance of salt water in the "D" sand when casing was perforated and this formation tested.

The third 9000-foot test for Shongaloo, north Webster Parish, found productive of gas and distillate in the lower Marine in one well, was announced last week by Magnolia Petroleum Company which owns the deep producer there and the other deep test drilling. Location for the third test is on a unitized 160-acre tract, being Roseberry and Bailey 1, SE 29-23n-9w. Drilling must begin within 90 days. Magnolia is following a 160-acre space plan in this field, where the discovery deep well was completed on a geophysical prospect in Section 32-23n-9w.

Leasing around the flanks of the shallow Haynesville field, Claiborne Parish, classed as a tilted domal structure, and which produces from the Ozan at 2800 feet, is gaining momentum. On the south flank of this structure Ohio Oil Company continues to secure acreage around Sections 19, 27 and 35-23n-8w, and in the same locality Lion Oil Refining Company and Skelly Oil Company are securing acreage. On the northwest flank of this field around Section 12-23n-9w, Gulf Refining Company is taking some additional leases.

Gulf has also been leasing west of the Shongaloo field, Webster Parish, as has been Stanolind Oil & Gas Company. North of Cotton Valley, Oliphant Oil Company leased 200 acres in Sections 2 and 11-21n-10w, Webster Parish.

Skelly Oil Company secured eighty acres in Section 24-18n-15w, Caddo Parish, near Blanchard and also leased 140 acres in Sections 17 and 18-15n-16w, Caddo Parish, on the southeast edge of the Bethany gas and oil field. The Texas Company is renewing its leases in the Blue Lake (West Zwolle) area, Sabine Parish, in township 7 north, ranges 13 and 14 west. Stanolind Oil & Gas Company has moved a seismograph unit from Union County, Arkansas, to Morehouse Parish, Louisiana, where it is now working in township 23 north, range 4 east.

NORTH LOUISIANA Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Bossier (Bellevue)—		
Premier Investment Co., Wyche 46, 14-19n-11w	15	430
Caddo (Pine Island)—		
Carney et al, Hart 2	10	1800
W. D. Chew, Stiles 4, 33-21n-16w	60	1870
W. C. Knox, Burton 1, 7-20n-15w	50	1575
Ben Long, Crystal Oil Fee 1, 25-21n-16w	¶2	978
Nat Wiseman, Stiles A-1, 28-21n-16w	30	1043
Grant (Urania)—		
Fred Stovall, Matthewson 1, 15-9n-1e	*	1542
De Soto (Dolet Hills)—		
J. A. Lanier, Jal 1, 5-11n-11w	¶20	4205
Claiborne (Lisbon)—		
Magnolia Pet. Co., Patton Est. B-1, 13-20n-5w	960	5407
Webster (Wildcat)—		
Sibley-Sabine Oil Corp., McDonald 1, 32-17n-9w	*	6279

*Failures; †Junked; ¶Million cu. ft. gas.

Arkansas Fields

Fourth oil well completed in Magnolia field

El Dorado, Ark.—Completion of the Magnolia field's fourth oil producer in the Permian lime, staking of three new locations in that field, and more indications of production in a deep test five miles south of the Village field, all in Columbia County, featured activity last week in Arkansas.

The Magnolia (Kerr-Lynn) field added Atlantic Refining Company's Levi Garrett 1, C NW SW 13-17s-20w, Columbia County, flowing 25 barrels of oil per hour through ¼-inch tubing choke with tubing pressure 1175 pounds and casing pressure, 1225 pounds. The well was completed through perforation 7580-7622 feet; total depth 7622 feet.

Tidewater Associated Oil Company and Seaboard Oil Corporation are running electrical log to bottom at 7319 feet in J. T. Beene 1, C SE NW 15-18s-19w, Columbia County, 5 miles south of the Village field. This test logged 4 feet of saturation between 7000 and 7008 feet and also from 7310 to 7319 feet.

Schuler well appears to be near northeast edge of pay

El Dorado, Ark.—The northeast producing limits of the lower Marine horizon at Schuler, Union County, appear to have been neared in Phillips Petroleum Company's Edwards 1, SWc South half NE 17-18-17, which after being perforated at four separate levels in the lower Marine and swabbed, refused to flow and apparently will have to be standardized. The east and southeast limits of Schuler, as well as directly to the west, have not yet been defined.

Amerada Petroleum Corporation is negotiating with several lumber companies for acreage in Bradley County around township 16, range 10, where it has had a seismic unit working for the last eight months. This unit is now working in township 16, range 12. Phillips Petroleum Company leased west half of SE 5-18-20, south of the Magnolia field, Columbia County. Ohio Oil Company last week added more than 200 acres to its holdings in LaFayette County in Sections 13 and 21-16-24. Geophysical units of Atlantic Refining Company, Mid-Continent Petroleum Company, and Standard Oil Company of Louisiana are working in Columbia County, while similar units of Ohio Oil Company, and Phillips Petroleum Company continue to work in Union County.

Arkansas board issues fourteen drilling permits

El Dorado, Arkansas.—Fourteen drilling permits were issued last week by the Arkansas Board of Conservation, as follows:

Columbia County—Southwood Oil Company, Incorporated, Levi Garrett 1, SW SW 13-17-20; Normandie Oil Corporation, Levi Garrett 1, located 660 feet S & W NEc NE NE 23-17-20.

Franklin County—Ozark Natural Gas Company, J. S. Turner 1, C SE NE 32-10n-26w.

Union County—Lion Oil Refining Company, Sewell 3, located 459 feet west and 660 feet south NEc Lot 4 NW 18-18-17; Hardy-Murphy 9, located 185 feet south and 443 feet east NWc NE NW 9-16-15; Phillips Petroleum Company, El Dorado 2, located 330 feet south and 660 feet east NWc NW SE 12-18-18; Amanda 1, C south half NE SE 12-18-18; Amanda 2, located 330 feet south and 660 feet west NEc NE SE 12-18-18; H. P. Sewell 7, located 330 feet south and west NEc Lot 4 SW 7-18-17; H. P. Sewell 8, located 1300 feet north and 425 feet west SEc Lot 4 SW 7-18-17; H. P. Sewell 9, located 330 feet north and west SEc Lot 4 NW 7-18-17; Sam Richardson and C. H. Murphy, Jr., Betty Francis-Green Morris 1, located 250 feet south and east NWc NW SW 7-17-13; J. R. Lockhart, W. N. Raulston, 4, located 330 feet north and 338 feet east SWc NW SE 12-17-14 and Hollyfield and McFarlane, Scott Murphy 6, located 200 feet east and 232 feet south NWc east half SE NW 9-16-15.

Thirty-four permits issued in Louisiana

Shreveport, La.—Thirty-four drilling permits were issued last week by the Louisiana Conservation Commission, of which fifteen were in North Louisiana divided among the following parishes: Bossier, one; Caddo, five; Claiborne, one; LaSalle, one; Sabine, three; Union, two; and Webster, two. Those in south Louisiana were divided among the following parishes: Acadia, four; Beauregard, one; Calcasieu, one; Cameron, one; Evageline, two; St. Bernard, one; St. Mary, nine.

ARKANSAS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Columbia (Magnolia)—		
Atlantic Ref. Co., Levi Garrett 1, 13-17-20	600	7627
Miller County (Garland City)—		
Red River Valley Oil Co., H. Beck 1, 34-15-26	*	3008
Union County (Smackover)—		
Lion O. R. Co., Hardy-Murphy 8, 9-16s-15w	65	2445
Union County (Rainbow City-Champagnolle)—		
Ohio Oil Co., R. Furlong 5, 12-17-14	392	3010

*Failures; †Junked; ¶Million cu. ft. gas.

MISSISSIPPI

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Lamar (Wildcat)—		
South Miss. Pet. Corp., Morris 1, 4-2n-14w	*	3028
Rankin (Jackson)—		
Love Pet. Co., Gulf State Creosoting Co. 1, 36-5n-2e	¶38	2356

*Failures; †Junked; ¶Million cu. ft. gas.

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Kentucky Developments

Wildcat showing for new pool or wide Birk City extension. New Spottsville area will be provided pipe line outlet.

Owensboro, Ky.—A wildcat that may open a new pool or provide a large extension to the Birk City pool cored a 17-foot McClosky saturation at 1853 feet. It is Snowden & McSweeney et al's J. T. Griffith 1, 2 miles north of Reed in Henderson County, near the Daviess County line. It is 5 miles north of the defined limits of the pool.

A cable rig is being moved in to complete the well, which is expected to be a 200-barrel producer. The test is 1 mile south of the Ohio River and offers encouragement to exploration in Warrick County, Indiana. An offset 1000 feet east has been started by these operators on the J. P. Miles farm.

Major Oil Company's Carrie Long 1, which cut a McClosky core indicating production of 250 barrels daily, promises a half-mile northerly extension to the Birk City Pool. Tanks are being erected and a production string of casing has been set. Derrick and tools are being moved to Carrie Long 2, about 2500 feet north.

A closely-watched wildcat in the Cario section, 12 miles south of Henderson, Phillips Petroleum Company's Ike Royster 1 wore out a swab tongue in an effort to exhaust a heavy flow of salt water. As the well drilled past a slight showing in the McClosky, it is not yet known whether the water comes from or below the McClosky. An attempt is being made to shut off the water, but at present the outlook for making the well a commercial producer is dark. This company's R. Sights 1, 2 miles north of the Royster 1, was shut down at 621 feet with mechanical trouble.

In Hopkins County, Gulf Refining Company's L. W. Schemetzer 1 was being closely watched as the first deep test in that area. It passed through a favorable Jett-sand saturation and continued on toward the McClosky. The bit was below 1700 feet at last report.

Hopkins County is about three fourths leased, with Gulf Refining Company holding about 15,000 acres, and 55,000 acres scattered among independent operators. Other acreage holders are Carter Oil Company, 50,000 acres; Chester Oil Company, 12,000 acres; Snowden & McSweeney, 10,000 acres; Sun Oil Company, 10,000 acres, and Nollem Oil Company, 10,000 acres. The 60,000 acres unleased is scattered all over the county.

In the Spottsville section of Henderson County, interest was directed toward Magnolia Petroleum Company's W. H. Negley 1, a 1000-foot west offset to this company's S. Green 1 which came in two weeks ago as one of the best wells in Kentucky and opened a new pool. The test was below 2150 feet, with about 50 feet to go before reaching the McClosky. This company's Cordie Neal 1 was setting surface pipe, and J. W. Isabell 1, ½-mile northeast of the Green discovery, was drilling at 600 feet. Maurice T. Grubb's Cooksey 1 was moving in material.

A survey for a pipe line to connect the new Spottsville pool to the Fordsville Gathering Line Company's line from the Birk City pool was started last week. Production at the discovery, meanwhile, is frequently shut in because of full tankage.

One and one half miles north of the edge of the Birk City pool, Major Oil Company's Logsdon 1 was given an acid treatment in an effort to make it a commercial producer. A saturated McClosky core had been removed. Nearby, the company's Mulligan 1 was drilling below 1735 feet with cable tools. Successful completion of this latter test should start drilling activity in the town of Stanley.

Major Oil Company's Prudential 1, 3½ miles northwest of Birk City, was abandoned at 2006 feet. It cut a McClosky core that was too tight for saturation. A second well may be started on the 600-acre lease shortly.

In the new Narrows pool near Hartford, Ohio County, E. L. Joiner & G. La Vigne's S. Davison 1 found the McClosky at 700 feet and after treatment with 2000 gallons of acid is showing for 35 barrels a day. L. D. Oil Company, contractor, has moved the rig 700 feet for the S. Davison 2.

W. E. Hupp et al's O. L. Shultz 1, on a 55-acre tract ½-mile from the Davison 1, drilling at 400 feet, was being closely watched as a possible pool extension. Mann & McLaughlin, Detroit, Mich., operators who discovered the pool, are drilling No. 2 on the discovery lease. Hunter & Son are the contractors.

Kentucky completed operations increased sharply last week, showing a gain of 8 over the previous week's 10. Included in the past week's lot were 11 oil wells averaging 197 barrels each initial production, 3 gas wells and 4 dry holes.

KENTUCKY Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Butler County—		
Cumberland Petroleum Co. et al, Hawkins 2	35	547
Jess Ashby et al, Tanner School 1	10	834
Daviess County—		
Aetna Oil Service Co., Dempwolf 3	200	1890
W. H. Hupp and Snowden & McSweeney, L. Taylor 7	150	1895
L. C. Young & George Engle, Howard 1	100	1440
Grayson County—		
A. V. Smith et al, Porter 4	*	338
Hancock County—		
J. C. Ellis, Richards 19	25	367
Henderson County—		
Magnolia Petroleum Co., S. Green 1	1500	2176
Bur-Kan Petroleum Co., B. Green 1	100	2550
Kentucky Natural Gas Co., Overfield Estate 1	40	721
Carter Oil Co., Archer 1	*	1952
Lawrence County—		
Ashland Oil & Refining Co., Skaggs 1	¶	833
Lee County—		
Roy Eastin, McLyn 28	1	....
Snowden, Snowden 2	*	847
McLean County—		
Cleopatra Oil Co., Moseley 1	*	....
Martin County—		
Kentucky-West Virginia Gas Co., Ward 5246	¶.54	2436
Ohio County—		
Lewis & Lang, Russelburg 3	10	....
Bolling & Callas, Zimmerman 6	¶2.50	....

*Failures; †Junked; ¶Million cu. ft. gas.

Knox County, Indiana, test has show in Salem sand

Evansville, Ind. — Parshall-Graham Oil Company's M. Jordan Simpson 1, Section 23-1n-10w, Johnson Township, Knox County, passed through 3 feet of tight saturation in the McClosky at 1719 and found 15 feet of tight saturation in the Salem, about 385 feet deeper. It is now drilling below 2100 feet in the Devonian. The showing in the Salem was considered significant as pools in this formation yield a light oil that commands a premium. It is not found, however, in large bodies like the McClosky. This company's Lane 1, near Decker, Knox County, was drilling at 2721 feet.

In Spencer County, Frank Damron et al's A. W. Haines 1, Section 34-7n-6w, Oil Township, 1½ miles south of Rockport, has a difficult fishing job. The drill stem parted and the fishing

EASTERN FIELDS Completions

OHIO

Company, Well and Location	Init. Prod. Bbls.	Depth
Athens County—		
Williams Bros., Crawford 1	*	1700
Delaware County—		
McBride Gas Co., Weaver 1	¶.50	435
Guernsey County—		
Jones & Jewell, Shepherd 1	*	1398
Knox County—		
Pure Oil Co., Clark 1	50	3193
Davis Oil Co., Veatch 3	¶	935
Licking County—		
Rutledge et al, Teagarden 13	10	617
Meigs County—		
Fugate et al, Diehl 3	¶.10	947
Muskingum County—		
Wittmer Co., Bowden 2	*	4081
Perry County—		
Ohio Fuel Gas Co., Jones Coal Co. 5	¶1.10	3722
Wehrle Co., Beaver 1	*	3448
Tuscarawas County—		
Brendel Producing Co., Stone Creek Brick Co., 1	¶.98	4863
East Ohio Gas Co., Metzger 1	¶	4340
Washington County—		
McVay Bros., Armstrong 1	15	772
Heldman et al, Schlarb 1	¶.15	1280
Witago Oil Co., Freese 1	¶	1025

WEST VIRGINIA

Company, Well and Location	Init. Prod. Bbls.	Depth
Boone County—		
Hope Natural Gas Co., Nunnencamp 7726	3	2480
Cabel County—		
Holton Gas Co., Holton 1	¶.50	1839
Adkins, Beckett 1	¶.28	2390
Calhoun County—		
Dun Mar Oil & Gas Co., Weekley 1	¶.37	1588
Stewart et al, Francis 2	¶.08	2090
Kanawha County—		
United Fuel Gas Co., Odell & Glass 4804	¶11.68	4937
Milan & Odell 4805	¶11.58	4893
Legg 4806	¶7.00	5105
Spartan Gas Co., Fisher 1	¶4.87	4904
Pure Oil Co., Williams Coal Co. 291	¶.88	....
Lincoln County—		
Guyan Gas Co., Jeffers 1	¶.13	3045
Pleasants County—		
Wilson & Smith, Wilson 2	2	1680
Dinsmoor & Co., Noland 1	¶.20	1846
Putnam County—		
Teaves Oil & Gas Co., Mitchell & Gibson 1	¶3.63	1603
Wayne County—		
Woodall-Jackson Gas Co., Sanson 1	¶2.00	3149
Kentucky-West Virginia Gas Co., Ferguson W-55	¶.09	3006
Wood County—		
C. E. Love, Athey 2	*	1265

*Failures; †Junked; ¶Million cu. ft. gas.

tools are hung in the hole due to cavings from above. Bottom is at 1470 feet, believed to be less than 10 feet from the McClosky. A well drilled years ago 1500 feet southwest of Haines 1 encountered the McClosky at 1476 feet. It is expected to take a week or more to clear the hole. Three miles to the west, these operators have rig up for the Cora Niles 1.

Midwest Development Corporation's Perry F. Jackson, Section 54-3n-9w, Palmyra Township, Knox County, completed a 10-day fishing job and at last report was drilling below 2680 feet. It is 9 miles east of Vincinnes.

On a 230-acre tract in a block of over 8000 acres held by The Texas Company in Warrick County, Lowell T. Phillips, Trustee's T. S. Phillips 1, Section 32-4s-6w, Pigeon Township, was drilling at 750 feet. Being drilled with cable tools, it wil be carried to the Trenton at about 3200 feet if commercial production is not obtained at a shallower depth. In the same county, Sycamore Oil Company's Flora Bell Collins 1, ½-mile southwest of Yankeetown, had surface pipe set. It is to be drilled to the McClosky with rotary tools.

Three tests in Posey County will be started as soon as title checking is completed, one each by A. M. Lacey, Hamilton & Roos, and Bond & Baileys. All will be in Point Township.

Other new tests announced include: In Gibson County, Mid-West Development Corporation on Section 15-2s-9w, Columbia Township, to be carried to the McClosky. In Daviess County, Mid-West Development Corporation's Kiefner 1, Section 2-2-5w, just south of Loogootee, to be carried to 2500 feet. In Orange County, Yingling Brothers' Al Scarlett 1, near Paoli, has rig up. In Vigo County, Arch Carpenter et al's Drake 1, 3 miles north of Prairie Creek, has rig up.

Gibson County is reported about 70 percent leased for oil and gas, with about 35 land and lease men working in that area. Principal lease holders, and the approximate number of acres held by each, are: Continental Oil Company, 10,000 acres; Superior Oil Company, 9,000 acres; The Texas Company, 8,000 acres; Gulf Refining Company, 7,000 acres; Carter Oil Company, 6,000 acres, and Ohio Oil Company, 6,000 acres. Present leasing interest centers in the south, west and southwest parts of the county.

West Virginia drilling permits show gain

Charleston, W. Va.—West Virginia drilling activity, as reflected in permits issued by N. P. Rhinehart, chief of the state department of mines, gained slightly in October over the previous month, contrary to the normal seasonal trend. Compared to a year ago, however, permits issued during the first ten months of this year were running far behind the same period of 1937.

Fifty-eight permits were issued in October, compared to 56 during the previous month, and 96 during the corresponding month a year ago. To date this year, 544 permits have been issued, compared to 901 last year.

Permits issued in October by counties are: Boone 1, Braxton 2, Cabell 5, Calhoun 4, Doddridge 1, Gilmer 8, Hancock 1, Harrison 1, Kanawha 8, Lincoln 3, Logan 1, Marion 1, Marshall 1, Mingo 1, Monongalia 1, Pleasants 3, Ritchie 5, Roane 2, Wayne 4, Wetzel 2, Wirt 1, and Wood 2.

Company, Well and Location	Init. Prod. Bbls.	Depth
PENNSYLVANIA		
Bradford District		
Penn Valley Crude Oil Corp., Redfield	8	....
F. J. Eisert, Loop Estate	1	....
Bradford Transit Co., 9 wells	9	....
Forest Oil Corp., 2 wells	2	....
Niagara Oil Corp.	1	....
J. P. Kervin, Fee	1	....
Curtis & Dunlavey, Fee	5	....
Victory Oil Co., Wright	2	....
T. H. Kervin, Jr., No. 2 Berry	1	....
G. L. Rhodes et al, Rhodes	4	....
Bradford: Water (Pressure) Well		
Forest Oil Corp., 2 wells	...	....
Butler-Armstrong District		
E. Z. Peffer, C. W. Peffer	5	....
Middle District		
W. O. Milton, S. G. Milton	½	....
C. J. Anderson, Jr., et al, D. McElroy	*	....
Cities Service Oil Co., Red Fox	10	....
New York-Pennsylvania: Gas Field		
New York State Natural Gas Co., L. E. Hanes	gas	....
Fayette County—		
Fox Bros., Rick 2	¶.13	....
Indiana County—		
Equitable Gas Co., Alshouse 3239	¶.05	3654
Washington County—		
Tague, Lutton 8	5	2414
Beedle et al, Pittsburgh Coal Co. 1	¶.10	3805
NEW YORK		
Allegany County—		
Cunningham Natural Gas Co., Shear 2	¶3.50	....

*Failures; †Junked; ¶Million cu. ft. gas.

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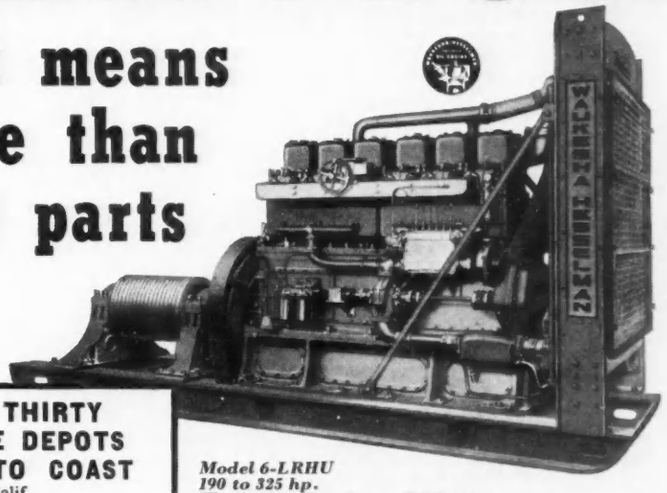

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WAUKESHA ENGINES

Illinois Developments

New pool opened in Jefferson County by 113-barrel flow. North Olney well sets record flow of 130 barrels hour.

Olney, Ill.—A new pool was opened last week when Magnolia Petroleum Company's Harvey 1, NW NE SW 22-2s-2e, Casner Township, Jefferson County, flowed 113 barrels through casing in a 24-hour test. The wildcat is 6 miles northwest of Mt. Vernon, and 12 miles south of Centralia. It is producing from both the Roseclaire and McClosky formations, topped at 2190 and 2230 feet, respectively. Drilling in a new area, where both Magnolia Petroleum Company and The Texas Company are large holders of acreage, is opened by the completion. A pumping unit is being installed which is expected to boost production.

Six miles southeast of Harvey 1, Dare 1, another Magnolia Petroleum Company wildcat, was waiting on cement. Located in SE SW NE 22-3s-1e, it was plugged back to 2780 feet after encountering salt water at 2800 feet.

In an area where production has previously been confined to the Benoist sand, Pierson's Wm. Lee 1, SW SE NW 9-1s-2e, Marion County, was nearing completion in the McClosky lime. In the southeastern part of the Lake Centralia pool, it drilled 12 feet into McClosky saturation topped at 2053 feet. It was waiting on cement before drilling in.

On the northwest edge of the Lake Centralia proven area, Helmerich & Payne, Inc.'s Anderson 1, Section 34-2-2e, topped the Benoist sand at 1905 feet and recovered a good saturation when cored to 1948 feet. Tankage was being installed and pipe run.

In Lawrence County, Dean Shendal et al's O. Pepple 1, NW NE NE 19-2n-11w, Dennison Township, started flowing after treatment with 2000 gallons of acid. A previous attempt to acidize the test, which is 2½ miles from nearest lime production, failed. Production, which operators estimated would be 200 barrels initial, is from the upper break of the McClosky, topped at 1987 feet. Only 3 feet of the formation was drilled.

In the same county, Joe Kesl et al's Scott Gray 1, Section 13-4n-11w, Russell Township, discovery well in the new Russellville gas field, was drilled 2 feet deeper into the Buchanan sand for an increase in production to 16,000,000 cubic feet. The test, completed 4 months ago on the top of the sand at 1061 feet with an initial production of 2,651,000 cubic feet, now ranks as the second largest gasser in the rapidly growing field.

Jack Shirley et al's test in NE 29-4s-7w, Randolph County, near Red Bud, reported a showing of oil in the Benoist sand at 515 feet. Operators said the test would be continued to the Trenton lime.

The first test to be undertaken in Schuyler County in the current development campaign was announced by Lincoln Bancroft et al for the Aber farm, 6½ miles southwest of Rushville. Location is on a block of 8000 acres and 4 miles from an abandoned test on the Luthev farm, where oil was found in the shaft. The well had been abandoned for 22 years.

Drill In Lake

The Texas Company has been granted the first permit to drill a well on an Illinois body of water. It will be in Lake Centralia, reservoir for Centralia's water supply. Company officials explained, according to Mayor Louis Peifer, who announced the permit was granted, there would be no danger of contaminating the water by waste from the well as a coffer dam would be driven into the lake bed near the shore line. The well will be drilled inside the dam, and when the test is completed the dam will be filled with sand to prevent any seepage from the well to enter the water. It will be an offset to a producer drilled on the Pittenger tract along the east side of the reservoir in NE 5-1n-2e, Marion County.

Production records in the North Olney field fell when The Texas Company's Elliott 1, Section 22-4n-10e, started flowing at the rate of 130 barrels an hour after acid treatment. A 24-hour test was impossible because of lack of storage. The treatment was given immediately after completion of the test, which had cored 8 feet of porous McClosky saturation with bottom at 3017 feet. This company's McCawley Baird 1, Section 22-4n-10e, was the only other successful completion in this field. It was flowing after acid treatment, but production figures were not immediately available. The Texas Company's C. Scherer 1, Section 22-4n-10e, was preparing to drill in.

Wicklund Development Company's Trustees of First National Bank of Olney, Section 34-4n-10e, filled with water when the plug was drilled with cable tools. It was deepened to 3130 feet before being abandoned.

Other current operations in this field are: The Texas Company's Ed Winter 2, Section 27-4n-10e, drilling at 2200 feet; Lough et al's Fred Schilt 1, Section 25-4n-10e, surface pipe set with cable tools and awaiting rotary rig to complete; Chas. Skinner et al's Sylvan Iris School 1, Section 23-4n-10e, drilling at 1000 feet; Kingwood Oil Company's W. M. McCane 1, Section 35-4n-10e, awaiting repairs to rig blown down in storm; Wicklund Development Company's J. Schnepper 1, Section 21-4n-10e, pits dug; Pyramid Oil Company's Ed. J. Houser 2, Section 15-4n-10e, location, and Bookins & Newman's Boatman et al 1, townlot well in Section 34-4n-10e, location.

The Texas Company paid high prices for two small pieces of acreage in the Lake Centralia field, where it holds more than 12,000 acres. The quarter-acre Pleasant Grove cemetery plot, Section 4, on which one well had been drilled, was bought from Potter Brothers and G. W. Johnson for $65,000. The one-acre Antioch school lease in Section 5 was purchased from independents for $97,500.

ILLINOIS

Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Clay County—		
Pure Oil Co., G. L. Travis 2B	77	3044
Schrugham Consolidated 1	479	3055
Tetrick 7A	46	3035
J. E. Moseley 2B	332	2994
Chas. Wilkins 11	662	3065
Schlafly et al, Nash 1	286	2978
Olson Drilling Co., Johnson 1	*	3077
Clinton County—		
Shell Petroleum Corp., Ellerman 1	102	1343
Farrelly et al, Bergeman 1	*	1403
Martin et al, A. Rensing 1	*	1290
Adams Oil & Gas Co., Kuester 1B	75	1372
Kuester 2B	50	1373
Coles County—		
Thompson Drilling Co., Degler 1	*	2277
Fayette County—		
F. H. Brown et al, Albright 1	*	1987
Ray Brown, Rosa Hopper 6	150	1561
Crosley Drilling Co., Welker 1	50	1581
Jarvis Bros., Yakey 3	128	1569
Carter Oil Co., L. Williams 1	101	1605
A. Hopper 1	552	1579
I. Howell 2	108	1593
J. T. Wright 2	272	1578
S. R. Meyers 2	893	1563
Burtschi, Fee 3	100	1520
Fee 4	190	1590
Magnolia Petroleum Co., D. Rhodes 3	120	1597
Paul Doran, Goetting 4	200	1500
Bob Garland, Miller 1	*	1856
Frankling County—		
Eason Oil Co., Orient Mine 1	*	3197
Jefferson County—		
Carter Oil Co., E. Cunningham 2	275	1959
Free-Cunningham 1	235	1966
Nollem-Benoist, Jefferson Liquidating Co. 1	*	3064
Lawrence County—		
C. E. Forman, W. H. Thompson 1	*	1247
Marion County—		
Ace Imenhauser, Fisher 1	39	1389
Kingwood Oil Co., Devor 1	233	2119
Maxwell 1B	235	1979
L. Deaner, Burge 2	156	1897
Magnolia Petroleum Co., W. B. Young 3	336	1787
Wanner et al, Young Church 1	360	1775
Paul Rossi, Brooks 1	2000	1774
Roberts & Murphy, Dempsey 1	600	1371
Moultrie County—		
Ralph Neely et al, Shuman 1	*	2007
Richland County—		
Pure Oil Co., S. S. Allard 2	416	3040
F. L. Wakefield 1	514	3003
Carpenter & Goldberg, Glathart 1	*	3096
J. V. Wicklund, Sager 4	341	2996
Pyramid Petroleum Corp., University of Chicago 3	*	3061
Wabash County—		
J. D. Toomey Estate, Courter 19	*	1560
Wayne County—		
The Texas Co., M. E. Heaton 2	409	3352

*Failures; †Junked; ¶Million cu. ft. gas.

Illinois publishes new oil bulletin

Publication of a bulletin on "Current Developments in Oil and Gas" was announced last week by the Illinois geological survey. Designated Circular No. 23B, it contains papers presented at the recent Fifth Annual Mineral Industries Conference, as follows:

"Developments in Illinois since January 1, 1937," by Alfred H. Bell; "Oil Exploration in the Eastern Portion of the Illinois Basin," by Theron Wasson; "Water Flooding of Oil Sands," by Paul D. Torrey; "Recent Developments in Water Flooding in Illinois Oil Fields," by Frederick Squires; "State Regulation of Oil & Gas Production for the Prevention of Physical Waste," by William Bell; "Changing Legal Concepts Affecting the Oil & Gas Industry," by Walter L. Summers, and "Economic Aspects of the Heating Oil Market," by Walter H. Voskill.

California Fields

Three companies plan joint work in Fresno County.

New deep pay zone is promised in Signal Hill field.

Los Angeles.—Encouraged by recent discoveries along the floor of the San Joaquin Valley resulting from geophysical tests, the Shell Oil Company and Richfield Oil Corporation have worked out a joint exploration program with the Western Gulf Oil Company on approximately 7500 acres northwest of Cantau Creek, Fresno County.

In addition to the acreage held by Western Gulf, Shell and Richfield obtained control of other parcels and are making a thorough geophysical test to determine just where to drill their first test well.

New impetus has been given to wildcatting in California with the completion of the Ohio Oil Company's F-1 well along the northerly edge of the Buena Vista Lake. This new producer and a wildcat well that Richfield Oil Corporation is drilling due west were drilled on the determinations found by geophysical crews and there is every reason to expect increased activities in scattered areas in the Valley.

Ohio's discovery is the seventh oil field resulting from geophysical efforts in California. Previous discoveries are: Ten Section, Greeley, Wasco, Canal, Rio Bravo, Wilmington. Four gas fields were also discovered based on these scientific surveys.

CALIFORNIA
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Dominguez—		
Union, Callendar 63	140	7485
Montebello—		
Pongrantz Petroleum, Martin 1	400	7431
Standard, Kaufman Fee 1	800	6465
Union, Paul Howard 3	244	5465
Torrance Extension—		
Bass & Goodnight, Hawkins 52	250	5231
Sierra Trading Corp., Sierra-Spring 1	151	5300
Sunset Oil, Security "T" 1	252	5304
Torrance—		
Standard, Marble 2-9	293	4990
Wilmington—		
General Petroleum, S.P. (LB) 17	1350	4103
Belridge—		
Belridge Oil, No. 31	2340	8450
Kettleman North Dome—		
K. N. D. A., No. 27-22Q	1400	8670
Mountain View—		
Hogan Petroleum, Wharton 10	350	5100
Rio Bravo—		
Superior, Geisinger 1	1898	11,480
Union, KCL 6-34	1500	11,514
Elwood—		
Barnsdall, Permit 88-6	160	3315
Santa Maria Valley—		
R. R. Bush Oil, Bradley Lands 4	650	4855
Rincon—		
C. C. M. O., No. B-23	409	4092
Rio Vista—		
Superior, Reclamation Board 1	¶36	3883
Dominion—		
Sierra Slope Oil, Micheals 1	•	965
Edison—		
G. W. Johnson, Brown-Paulette 1	•	1320
Terra Bella—		
Sheppard & Associates, Sheppard 3	•	956
Arroyo Seco—		
Texas Company, Lewis 1	•	4537

•Failures; †Junked; ¶Million cu. ft. gas.

Results obtained during a formation test in Richfield Oil Corporation's Tupman-Western 1, wildcat, Section 32-30-25, east of Elk Hills, Kern County indicate discovery of a new oil field along the floor of the San Joaquin valley. While making a water shutoff test with 8⅝-inch at 8406 feet and bottom of the hole at 8523 feet, the recovery was 250 feet of heavy gas-cut mud and the well flowed at rate of 7,000,000 cubic feet of gas along with a spray of 52-gravity oil. This test is three miles west of Ohio Oil Company's KCL F-1, Section 10-31-25, which discovered a new high-gravity field at Coles Levee, along the northerly edge of Buena Vista Lake, during the past week. This project developed a potential of 720 barrels daily at 9365 feet.

The new Shell - Richfield - Western Gulf play is about 15 miles northeast of the old Coalinga field, and 20 miles northeast of the Coalinga Nose development, which brought about proving up of production from the Eocene.

Now that the Wasco field, Kern, has been given a second commercial producer through the completion of Standard Oil Company's Mushrush 1 as a direct offset to the discovery well, it is definitely known as a "two-well" field without reservations. For some weeks field scouts were skeptical of the future for this field, mainly due to failure of Continental Oil Company to bring in its KCL A-3. Mushrush 1 developed a flow of 6500 barrels daily and will be choked in to conform to curtailment regulations. But its performance definitely returns this field to the spotlight. Continental is expected to spud in its third well to the southeast shortly, and Standard may complete a third well within a reasonably short time. The pay-off for deep zone wells at Wasco has been figured at two years, based on current allowables, but if future completions perform as satisfactorily as Mushrush 1, there will be little reason to worry.

Last week, the Union Oil Company completed its sixth well in the Rio Bravo field, Kern County. Its KCL 6-34, recorded an initial flow of 4300 barrels of 40.2 gravity oil, along with 3,353,000 cubic feet of gas per day from a depth of 11,514 feet, with casing cemented at 11,262 feet. Tubing pressure was 1925 pounds and there was 1900 pounds on the casing. To conform to field curtailment, the well has been choked in to 400 barrels daily through a 10/64-inch choke.

Following the reported coring of more than 100 feet of solid oil sand in the De Soto Oil Company's deep test well in the Lovelady pool area of the Signal Hill oil field, there are some anticipations of the development of a deeper productive zone than heretofore found in this Los Angeles Basin field. Signal Hill has been described for years as the "wonder field," due to its production of 500,000 barrels per acre since its discovery 17 years ago, or a total exceeding 600,000,000 barrels since 1921; and it now begins to appear highly probable that another cycle of deep zone drilling and exploration is about to take place in this area within 45 minutes ride of the heart of Los Angeles.

In 1921, Signal Hill was being advertised as the future residential section of Long Beach. Today, the hill is dotted with hundreds of wooden and steels derricks, all over pumping wells. The field today is producing around 54,000 barrels daily, less oil than water, but it is nevertheless a paying field. Should the De Soto well come in below 10,000 feet, it undoubtedly would bring about the renewal of a drilling and deepening campaign for scores of old projects that have remained shut in for years for various reasons. Some months ago, it was reported that major oil companies were entrenching themselves in the field by buying out in fee much of the townlot operators. If this is true, this might go toward elimination of a competitive drilling program which resulted in the rapid development of this Basin field. However, at this date, this appears improbable.

Casing is slated to be landed to 9900 feet in the De Soto well. First oil sand showings were encountered at 9750 feet and continuous showings were cored from 9845 to present bottom, which apparently justifies a production test. This is the deepest job for the field since Shell Oil Company drilled Nesa 11 to 9280 feet in 1929.

The Hathaway Company's Dore 1 in the West Montebello field was brought in last week for 250 barrels per day from 7181 feet. Herley-Kelly Oil Company's Masser 1 has been returned to steady production from what is described as the fourth finger of the Sixth zone, and is good for 1800 barrels daily from 6690 feet. Brookline Oil Company is preparing to deepen Drake Community 1, which originally bottomed at 6444 feet, and it will be cored ahead to take in the Sixth zone found in the Herley Masser well.

The California Company takes North Dakota lease

Mandan, N. D.—The Morton County Board of Supervisors last week awarded a lease on 3440 acres of county land to Thomas W. Leach, Tulsa geologist, acting for The California Company. The action indicated that the subsidiary of Standard Oil Company of California will undertake further exploration in North Dakota.

The lease provides that drilling equipment is to be moved in not later than August 15, 1939. The area is in the vicinity of St. Anthony and was surveyed by a seismographic crew last summer.

The first deep test to be drilled in North Dakota, The California Company's Nels Kamp 1, Williams County, in the northwestern part of the state, was abandoned at 10,280 feet several months ago because of mechanical difficulties. The company holds considerable state land in the northwestern part of the state under lease.

Acreage leased last week is in the southwest central part of the state.

New Mexico Fields

Milnesand test lacks sufficient saturation to make well.

Lea County drilling operations finally being eased off.

Hobbs, N. M.—Absence of adequate porosity in the Permian lime section to make a commercial producer has lessened the prospects of Shell Petroleum Corporation's Geo. Harwood 1, C S½ SE SE 27-7s-35e, located on the Milnesand structure, south central Roosevelt County. This wildcat has shared attention with a promising test in the Lovington area, Lea County, for several weeks as both were rated as probable discoveries of new producing areas.

The Milnesand project was coring lime at 4390 feet, with recoveries yielding minor saturation at intervals below 4150 feet. The necessary porosity in the lime to make a producer has been lacking. Harwood 1 is on a geophysical prospect, and checked 501 feet higher structurally than a dry hole situated 3¼ miles to the southeast in logging top of lime at 3495 feet, with an elevation of 4200 feet. This is unusual structural relief for the northwest portion of the Permian basin, and attracted attention in geological circles, as the shooting picture reveals a large area. Harwood 1 has penetrated 895 feet of the lime section. The nearby dry hole encountered sulphur water with a show of black oil at 4825 feet, or 880 feet in the lime. Top of the water was reached at 676 feet sub sea. The new test for the area has been equipped to drill to the Glorietta, or San Angelo sand phase of the Permian, and regardless of its outcome another well will be drilled by Shell Petroleum Corporation.

The Lovington prospect in Lea County along a northwest strike from the Hobbs field strengthened its outlook the past week, and also gained a second test. Westmount Oil Company's State-Amerada 1, C NW NE 12-17s-36e, 7 miles southeast of Lovington, logged gas zones above the big lime, and was drilling anhydrite at 3990 feet. It is 1¼ miles north by west of a dry hole that showed for a small oil well in the 4900-foot lime. The latter was plugged January, 1933, in sulphur water at 4985-5215 feet. State-Amerada 1 is structurally high when correlated with dry holes in the general area, having logged top of the Yates at 3060 feet, with an elevation of 3830 feet. Barnsdall Oil Company's State-Humble 1, C NE SE 33-16s-36e, located 3 miles northwest of Westmount's test, was drilling at 1500 feet. It is on a sublease from Humble Oil & Refining Company and requires production by December 17 to perpetuate the contract. Similar situation confronts other lease owners in the area during the fore part of 1939.

Lea County Eases Off

Lea County operations eased off in volume the past week when only 5 new tests were authorized. Besides the wildcat, the Langlie field gained 2 projects that involved Italo Petroleum Corporation's Carlson 1-A-23, NW NW SW 23-25s-37e, and Indian Petroleum Corporation 1, NE NE NE 6-25s-37e. In the Vacuum field, Continental Oil Company has rigged up for State 1-H-22, C SW SE 22-17s-34e, while Magnolia Petroleum Company's State 2-G, located in the northeast sector, was drilling at 1605 feet.

The Texas Company's State 1-U, C NE NE 2-18s-34e, southwest flank of the Vacuum area, gauged 103 barrels of pipe line oil in two hours, flowing natural through open tubing, with gas/oil ratio of 780/1. The hole was drilled at 4710 feet. The same company's State 1-V, C NE NW 34-17s-34e, also an outpost, encountered tight lime section in drilling to 4725 feet. It swabbed 2¾ barrels per hour after using 1000 gallons of acid, which required a maximum of 2700 pounds pressure to inject, and is testing after reacidizing with 2000 gallons. State 2-L, C NE NE 1-18s-34e, also drilled by the company on the southwest flank, flowed 239 barrels natural in 6 hours through tubing at 4710 feet. The well made 43.4 barrels oil on the last hour.

Cities Service Oil Company's State 1-L, C SE SW 15-17s-35e, northeast outpost, checked structurally low in logging top of anhydrite at 1830 feet, with an elevation of 3956 feet. Shell Petroleum Corporation's State 1-I, C SW NW 20-17s-35e, offsetting a small producer in process of completion, proved dry after 672-quart nitro shot at 4470-4753 feet. It may be deepened to water.

Continental Oil Company et al's Gene Howe 1-A, C SW NE 5-21s-38e, wildcat near east edge of Lea County, was abandoned at 3192 feet in anhydrite, with an elevation of 3575 feet. It was checking lower than a small wildcat oil pumper 1¾ miles to the south, Jas. Mascho et al's Cloyd-Conoco 2, Delaware failure drilled in southwestern Lea County, has been plugged. It was halted at 5038 feet last September.

NEW MEXICO
Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Curry County—		
Bond & Harrison, Hart 1, c nw se 13-2n-31e	*	3258
Eddy County—		
Martin & Lysette, Pardue-Guitar 1, se sw nw 29-24s-26e (w)	*	1875
Lea County (Eunice)—		
Continental et al, Lockhart 1-B-13, nw nw nw 13-21s-36e	250	3885
Lockhart 2-B-1, c se nw 1-22s-36e	2500	3810
A. E. Meyer 4-B-18, c e½ sw nw 18-21s-36e	360	3885
Lea County (Hardy)—		
Magnolia et al, Hardy 2, nw nw nw 29-21s-37e	43	3820
Lea County (Penrose)—		
Twin Oil Corp., State 1-B, c nw ne 17-22s-37e	172	3710
Lea County (Rhodes)—		
Ohio, M. Wills-Fleming 1, c ne nw 35-26s-37e	30	3300
Lea County (Vacuum)—		
Phillips Pet., State-Santa Fe 10, c ne nw 24-17s-34e	400	4706
The Texas Co., State 2-L, c ne ne 1-18s-34e	960	4710
Lea County (Wildcat)—		
Continental et al, G. Howe 1-A-5, c sw ne 5-21s-38e	*	3192
Jas. Mascho et al, Cloyd-Conoco 2, c sw se 20-22s-33e	*	5038

*Failures; †Junked; ¶Million cu. ft. gas.

"Pursuant to an order entered in Cause No. 99620-D, styled Lonnie Glasscock vs. T. H. P. Duncan, I offer for sale as receiver, to the highest bidder for cash, a 20-acre oil and gas lease, Duncan fee, Penn Survey, Gregg County, Texas.

This property has three producing wells, with the possibility of an additional permit.

All bids shall be posted with me, as receiver, on or before January 18, 1939.

For full details and all information concerning the property, communicate with the undersigned.

G. C. DUNN, Receiver
Great National Life Building
Dallas, Texas."

Texas oil men return from New Mexico hunt

A party of prominent Texas oil men recently returned from a big game hunt in the Black Range of New Mexico, west of Hot Springs. Although the hunt was cut short on account of severe blizzards, the party succeeded in bagging deer, turkey, and small game. A bear was trailed for several hours, but the hunters never succeeded in overtaking the elusive bruin.

Dallas men included in the party were Clint W. Josey and Don W. Josey, officials of the Rancho Oil Company, and Monroe H. Goode, independent operator. Other members of the party were John B. Carter, general manager of the Gem Oil Company, and T. A. Carlton of the Carlton Drilling Company, both of Houston; Lip Norvell of the Norvell-Wilder Supply Company, Fort Worth, and L. A. Wilke of the El Paso Chamber of Commerce.

A story describing part of this group's last year's hunt is carried in the November issue of Fur-Fish-Game. The author of this article is Monroe H. Goode, who also has an article in the December issue of Esquire.

Rocky Mountain Fields

Getting ready for test of Wall Creek sand at Cole Creek. Oil Springs drilling test has second heavy gas blowout.

Casper, Wyo.—Several extension wells in proved Wyoming oil fields were at critical depths at the close of the week while Wyoming wildcatting had a sharp rise with four tests starting.

General Petroleum Corporation's State 1, NW NE SE 16-35n-77w, a mile due north of the discovery well in the Cole Creek field, Natrona County, central Wyoming, is coring at 6810 feet in the top of the Frontier formation and is feeling ahead for casing point for 8⅝-inch string for a production test of the Wall Creek series. Plans are to recondition hole, and ream down to casing point, and set casing before coring into the Wall Creek sands. It will be 10 days to two weeks before a formation test will be made of the Wall Creeks in this Cole Creek extension which is regarded the most important well under way in the Rocky Mountain division.

Meanwhile, General Petroleum Corporation has run concrete substructure for State 2, CNW SE NE 16-35n-77w, which will wait on results in State 1 before moving in. Because of the rapidly advancing cold weather, operators took advantage of a brief warm spell to set concrete foundations in anticipation of a second test on the State section. The First Wall Creek was encountered from 6686-6879 feet in the discovery well Government 1, and though the sand held good saturation it was low in permeability and failed to yield commercial production at the Government 1 location, and the well drilled ahead to complete in the Lakota at 7974-8013 feet for 250 barrels daily flowing by heads.

The Wall Creek sands are principal objectives at Cole Creek. Twenty-four miles to the north Salt Creek, ranking twelfth among the nation's oil fields in production to date, has yielded nearly 270 million barrels of light oil from the Wall Creek sands. The parent company, Socony-Vacuum Oil Company, operates a 5000-barrel through-put refinery on the outskirts of Casper, 10 miles south and east of Cole Creek.

A quarter-mile south extension test to the Big Medicine Bow 64 gravity oil field, Carbon County, Ohio Company's William Kyle 5-A, CNW SE 26-21n-79w, joint with The California Company, is waiting on cement to set around 7-inch casing at 5267 feet in the First Sundance sand, topped at 5619 feet, and with hole bottomed in saturation at 5649 feet.

Second Blowout

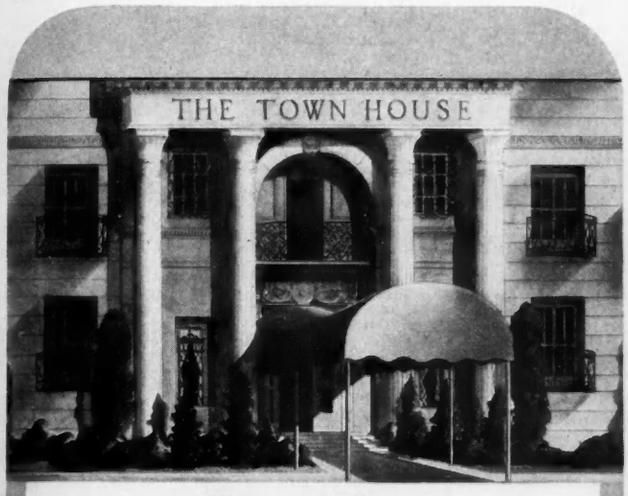
Ohio Oil Company's Baker 3-A, SW NW SW 2-23n-79w, a little more than a quarter mile south of the Cunningham Oil Company's discovery well in the Oil Springs gas field, Carbon County, blew out Wednesday afternoon for the second time and is flowing an estimated 35 to 40 million cubic feet daily along with some 20,000 barrels of water. The gas is from the Morrison formation at 1786 feet and the water from the Dakota at 1510 feet. A week ago the company had succeeded

MOUNTAIN STATES Completions

COLORADO

Company. Well and Location	Init. Prod. Bbls.	Depth
Huerfano County—		
J. W. Tomkins, Tomkins 1-X, nw ne ne 10-29s-69w	*	410
WYOMING		
Natrona County (Salt Creek Field)—		
Stanolind, Midwest Oil Co.-TP 8, cnw sw 35-40n-79w	230	4005
Niobrara County (Lance Creek Field)—		
Mackinnie Oil & Drilling, Thompson 4, se sw ne 7-35n-65w	2379	5458
Park County (Elk Basin Field)—		
Stanolind, 26 Elk-2, ce¼ ne 24-58n-100w	¶20	2496

*Failures; †Junked; ¶Million cu. ft. gas.



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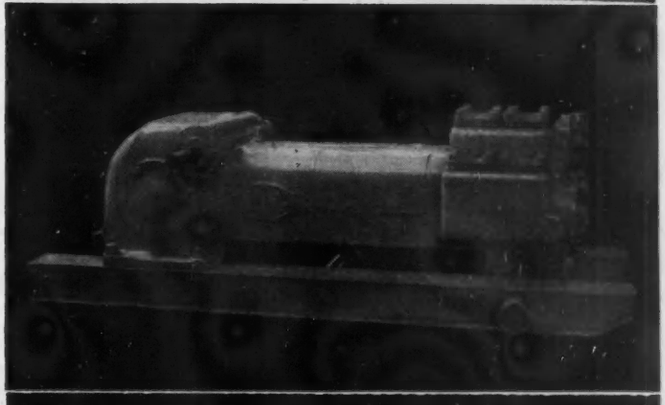

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in bringing the well under control, installing a specially designed control head with a swage and nipple fitted into the mouth of the 10-inch surface casing as a seat and made fast with split couplings. Operators are again working to bring well under control preparatory to running pipe to case off the Dakota and complete. Gas in the discovery was encountered in the Sundance formation, and water and gas were encountered in a test 400 feet south of the present location. The Morrison was dry in both tests, and gas is believed to be venting up through a fissure into the Morrison sand at the Baker 3.

Eight miles southeast of Lance Creek, Niobrara County, Cow Gulch Oil Company's Magoon 1, NE NE SW 33-35n-64w, Young Woman Creek structure, an important wildcat drilling on the 10,000-acre Magoon block, was coring below 500 feet and nearing its first objective, the Sundance series. Test started in the Upper Dakota formation and should reach the Sundance formation some 3000 feet shallower than in the Lance Creek field where the Basal Sundance formation forms the first important light oil reservoir in the field. Below the Sundance, Magoon 1 has the Minnelusa series with Leo sand as a possible oil bearing stratum. At Young Woman Creek the Leo should be reached between 2000 and 2100 feet as compared with 5250 feet in Lance Creek.

Sidney H. Keoughan and Taylor Oil Company are drilling at 600 feet in Sheets-Government 1, SE NE SE 9-55n-96w, a semi-wildcat test and a first report in Big Horn County, northern Wyoming. Test is on the South Fault block of the Byron field, and is three miles from the developed production in the north of the structure. Objective is the Wall Creek, expected at 3800 feet, and test is drilling to validate permit before the close of the year. Some 5000 acres are held by Keoughan and Taylor Oil Company, covering the south fault block area.

E. R. LONG, field clerk for Sun Oil Company at Beeville, Texas, has been transferred to Rio Grande City. He was replaced by C. R. Carney, who was a production clerk in the Dallas district office. H. Mercer Johnson, former field clerk at Odessa, Texas, has been moved to Dallas.

Michigan Fields

Encouragement is given by two wells in Clare County.

Drilling continues active in Southwestern Michigan.

Mt. Pleasant, Mich.—The probability that Higelmire Trustee's Van Horn 1, Section 3-18n-6w, and Pure Oil Company's Switzer 1, Section 27-19n-6w, 1½ miles apart, north-south, opened different pools from the same horizon rose higher this week and left a question mark on the value of between 400 and 600 acres, undrilled, between the two wells in Clare County.

Two wells, offsets, half mile north of the Higelmire discovery producer, a mile south of the Pure-Switzer producer, fell off structurally on the Monroe, producing horizon of the fields, and after flowing about 30 barrels on initial drill in went dead and bailed salt water.

Gulf Refining Company's Hall 2, NW SE SW, Section 34-19n-6w, Redding Township, topped the formation at 3915 feet and bottomed at 3923 feet. The well filled 5-3/16-inch casing and flowed for 5 minutes and went dead. Bailer tests later showed 2200 feet of brine from bottom hole. Daily Crude Oil Company's Van Horn 3, west offset to Hall 2, fell off further structurally with top and pay at 3930-33 feet. Well flowed 30 barrels over night but tested 2100 feet of bottom salt water the following morning. Flowing wells, ranging up to 5000 barrels daily potentials, were completed 10 days ago on south locations, 660 feet, of both leases.

Twenty-five wells, proving 250 acres, have been drilled in the Higelmire Trustee discovery area. A mile west of this part of the play, McClanahan Oil Company's State 1, Section 33-19n-6w, is producing 200 barrels per day by flow from the same horizon.

Four commercial wells have been completed in the Pure-Switzer area, each drilled on a 20-acre location.

Temporarily shut down at 3435 feet, Norton & Kramer's Sharp 2, Section 30-14n-8e, Akron Township, Tuescola County, south location from the Sharp 1 producer drilled this spring, so far has failed to develop oil equal to the discovery. At 3435 feet, Sharp 2 is 9 feet deeper in the Monroe horizon than the discovery producer. Light saturation was logged and operators may shoot.

This test has been closely watched by Michigan operators due to the fact that it offered considerable evidence toward developing production from deeper zones of the Monroe lime horizon. The Sharp is producing 497 feet below the top of the formation or 841 feet below top of the Dundee formation, chief producing horizon so far developed in Michigan. Sharp 1 was partly responsible for deepening or new starts on five tests in the state.

Wildcat Abandoned

Fortney Oil Company is abandoning Sias 1, Section 19-14n-2e, Midland County wildcat, at 3819 feet. Shows were logged 7 and 181 feet in the Dundee, checked in at 3636 feet, with water coming in at 183-185 feet in the lime.

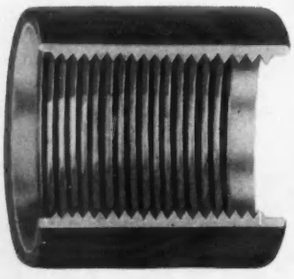
In Southwestern Michigan, Ross & Leman continued to swab and pump test Landrus 1, Section 11-1s-15w, Van Buren County, four miles west of the Bloomingdale townsite 1200-foot Traverse lime play. Landrus is estimated good for 50 to 75 barrels per day from 1173 feet. Five new locations have been staked.

MICHIGAN Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Allegan County—		
Black Rock Oil Co.'s Harnish 2, sw ne sw 30-4n-12w	225	1576
P. K. DeGuenther's Church 1, se se nw 2-3n-13w	*	1680
Stewart et al's Freye 2, se nw sw 22-4n-14w	325	1480
Salem Gas Co.'s George 3, se nw sw 21-4n-13w	15	1564
Haze & McGill's Benson 1, sw nw se 34-3n-16w	*	1345
Clare County—		
Pure Oil Co.'s Van Horn A1, ne nw sw 3-18n-6w	700	3892
Socony Vacuum's Van Horn 7, se ne nw 3-18n-6w	2450	3889
Basin Oil Co.'s Van Horn 2, ne ne ne 4-18n-6w	600	3905
Taggart Brothers' Fed. Land Bank 1, c se 35-19n-6w	*	1590
Gladwin County—		
National Oil Co.'s Campbell 3, nw nw se 27-18n-1w	150	3600
Midland County—		
Sun Oil Co.'s State 15, nw sw se 27-16n-1w	350	3784
Fortney Oil Co.'s Sias 1, se ne nw 19-14n-2e	*	3819
Ottawa County—		
R. C. Lentz's Hoezee 1, ne se nw 30-5n-14w	*	1511
Van Buren County—		
Bridger Basin's Brown 1, ne se ne 17-1s-14w	300	1202
Wicklund Development Co.'s Loughlin 1, se se ne 17-1s-14w	800	1205
MR&T's Merrifield 1, se ne ne 17-1s-14w	50	1216
E. Shoemaker's Rodgers 1, ne se ne 17-1s-14w	150	1206
Prather & Hurt's Rumery 1, nw se ne 17-1s-14w	150	1222
Lima Drilling Co.'s Rouse 1, nw sw nw 32-1s-14w	*	1443

*Failures; †Junked; ¶Million cu. ft. gas.

A. P. I. "X-L"



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IMPORTANT WILDCAT TESTS

ALABAMA

Barbour — H. A. Stebbinger's Mrs. Alyce Robertson 1, ne ne 19-10-26, rur. **Choctaw**—Joe Modisett et al's McCorvey 1, se sw sw 20-9n-2w, owdd 7520 ft. **Greene**—R. T. Jeffrey's R. C. Lett 1, 3-20n-2e, sd 720 ft. **Lawrence**—Mid-Southern Pet. Co.'s Rob Jacobs 1, sw se 11-7-7, ruct. **Mobile**—J. C. Prine's King 2, ne ne 4-1n-4w, sd 1120 ft.

ARKANSAS

Calhoun—Samuel S. Alexander's Smythe 1, c ne ne 7-11-14, base anhydrite 2985 ft, sd 3275 ft. C. E. Murdock's Southern Kraft 1, nw nw 17-14-13, sd 3110 ft. **Columbia**—Atlantic's Levi Garrett 1, c nw sw 13-17-20, elev 264 ft, base anhydrite 3233 ft, top James lime 3767 ft, top Cotton Valley 5271 ft, completed flowing 139 bbls per hour through half-inch tubing after perf csg 7580-7622 ft, td 7627 ft. Petroleum Finance Co.'s Barnett 1, c nw se 14-17-20, spd, woc surf csg. Standard of La.'s E. D. Harris 1, c sw ne 15-17-19, 9⅝ csg 2429 ft, unlodging stuck drill stem, td 7193 ft. Tidewater-Seaboard's J. T. Beene 1, c se nw 15-18-19, elev 232 ft, top lower Marine 5886 ft, arr core 7310 ft. Southwood Oil Co.'s Levi Garrett 1, c sw sw 13-17-20, spd. Normandie Oil Corp.'s Levi Garrett 1, ne ne 23-17-20, rur. **Craighead**—Tenn-Ark Inc.'s Martin 1, 35-14n-3e, ruct, td 1754 ft. **Crittenden**—Stanley Oil Corp.'s D'Anner Hrs. 1, c 18-8n-9e, sd 3351 ft. **Hot Springs**—J. H. James, Tr.'s Sturgess Lbr. Co. 1, sw sw se 26-6s-18w, dk and mir. **Little River**—Barbere et al's Mills 1, se sw nw 18-12-29, ru and sd. Clark et al's Strawn 1, se sw 20-10-32, woc 62 ft. Hartford Oil Corp.'s Denning 1, ne ne sw 6-13s-30w, sd 1735 ft shale. D. L. Hersey et al's W. D. Waldrop 1, se nw 4-13-31, top anhydrite 2208 ft, ran electrical log, arr deepen 3446 ft. **Lonoke**—Cabot Drlg. Co.'s Cabot Townsite 1, 18-4n-9w, 4½ in csg on pckr 1540 ft, dr 2420 ft, last report. J. W. Anderson's Eddington 1, c nw ne 7-4n-9w, dr 910 ft, last report. Hudson et al's Young 1, sw nw 8-3n-7w, sd 225 ft. J. F. Russell's J. T. Gunter 1, se se 17-5-10, sd 1650 ft. **Mississippi**—Benedum & Trees, Winston Mack 1, nw sw 3-15n-12e, dr with ct 3106 ft. **Nevada**—Texas Canadian Oil Corp.'s Stocks 2, sw se 9-15s-22w, 6⅝ in csg 1359 ft, top Nacatoch 1206 ft, pumping wo gauge, td 1402 ft; Stocks 3, se se 9-15-22, rur. Paul Bowlen's Pelt 1, c ne se 8-15-22, rur. J. E. Spears' Fee 1, 18-14-21, spd. **Pike**—Bruce E. Wallace's Tilyou 1, ne se 26-8s-24w, fsg drill stem 395 ft. **Pulaski**—Coker Oil Corp.'s Stone 1, 36-3n-11w, sd 905 ft. A. L. Kitselman's Fee 1, se sw 2-1s-13w, sd 3975 ft. **Union**—Fohs Oil Co.'s Craig 1, c se ne 5-18s-14w, elev 251 ft chalk 2352-2549 ft, top Meekin sand 2550 ft, top Graves sand 2680 ft, Tokio red beds 2705 ft, dr 5045 ft, gray sand.

CALIFORNIA

LOS ANGELES BASIN

Los Angeles—W. E. Entrikin's D-1, 7-3-13, rur. Royal Land's No. 1, 8-4-17, dr sand and shale 1185 ft. Richfield Oil's Dominguez Estate 1, 2-4-13, dr sand and shale 2600 ft. John McKeon's Carmenita 1, 21-3-11, dr sand and shale 8750 ft. Continental's Newhall 1, 20-4-17, dr hard sandstone 1621 ft. Mangrum & Page's Lintz 1, 4-3-5, rur. Newhall Drilling's Needham 4, 13-3-16, co 2300 ft, td 3505 ft. Rolling Hills Petroleum's Weston 1, 27-4-14, preparing to land casing 5100 ft. Texas Co.'s Anderson-Spring 1, 9-2-15, dr sand and shale 5715 ft. R. T. Grady's Sepulveda 1, 23-5-14, rur. Hogan Petroleum's Burkhard 2, 6-5-13, rur. **Orange**—Shell's Irvine 1, 6-7-9, lcn. A. V. Oil's No. 1, 16-6-10, preparing to gun perforate below 4000 ft, td 4751 ft. **San Bernardino**—Carbon Canyon Oil's Schuh 1, 30-2-8, rur. Southern Counties' Los Serranos 1, 22-2-8, dr sand and shale 2350 ft. **San Diego**—Dauphin Development's Irwin Kelly 1, 16-12-4, dr hard rock 723 ft.

SAN JOAQUIN VALLEY

Fresno—Petroleum Securities' No. 37-7F 7-20-16, foundation; Same, No. 88-7F, 7-20-16, r 7710 ft, td 7738 ft; Same, No. 71-18F, 18-20-16, rir. Standard's No. 71-13C, 13-20-15, rig; Same, No. 1-17F, 17-20-16, rur. Superior's Cagle 1, 6-20-16, foundation; Same, Coalinga Fee 2, 7-20-16, dr sand and shale 5119 ft. Leo F. Jarvis' No. 2, 14-20-14, rigging up portable outfit. Progressive Oil's California 3, 20-19-15, lcn. Stuart Oil's Stuart 1, 12-21-14, dr blue shale 875 ft. Tide Water Associated's Fleishacker 57-1, 1-19-15, dr hard shale 6218 ft. Dauphin Development's Ragan 1, 19-21-14, dr conglomerate 4157 ft. **Kern**—California Exploration Co.'s California Lands-Dougherty-Salisbury 1, 7-29-24, dr sand and shale 7303 ft. Shell's KCL B-87-4, 4-30-25, dr sand and shale 9375 ft. Ohio's KCL F-1w, 10-31-25, completed for initial of 720 bbls daily 9365 ft. Gibson Oil's Alferitz 3, 14-25-18, co 1222 ft, td 1230 ft. F. M. Pottenger's Villard 1, 2-26-28, rur. G. E. Renner's R.H.L. 2, 27-30-30, dr granite 2050 ft. Richfield Oil's Tupman-Western 1, 32-30-25, wocs 8523 ft. Shell's KCL A-58-8, 8-27-26, dr shale and gray sand 7973 ft. Texas Co.'s Camp-West-Lowe 1, 7-29-27, co 8360 ft, td 10,122 ft. Petrol Corporation's Reserve-Petrol 33-5, 33-11-19, sd 6988 ft. Richfield Oil's KCL 1, 28-11-20, dr sand and shale 8158 ft. Tide Water Associated's S.P. 2, 15-11-19, dr sand 1000 ft. Superior's KCL 12, 3-30-16, rur. E. S. Brooks' Smith 1, 34-27-27, lcn. A. V. Oil's Violette 1, 27-26-28, lcn. Federal Drilling's B & G 4, 13-26-27, lcn. W. P. W. Petroleum's Glide 1, 19-26-28, dr shale 1800 ft. Western Exploration's Hyde 1, 32-26-28, lcn. Julius Freid's No. 1, 34-32-24, dr brown shale 4800 ft. General Petroleum's St. Helens 2, 12-28-20, wocs 1388 ft. Continental's KCL E-1, 17-30-26, redrilled 8187 ft, recemented liner, td 8574 ft. Richfield Oil's Union Avenue 1, 6-30-28, dr shale and sand 7642 ft. Continental's KCL A-3-8, 8-27-24, swabbing 13,185 ft; Same, KCL A-4-8, 8-27-24, lcn. Standard's KCL 8-B-1, 17-27-24, dr hard gray shale 13,721 ft.

COASTAL COUNTIES

Santa Barbara—Douglas-Stratton's No. 1, 8-8-33, preparing to deepen 6239 ft. Richfield Oil's Tinaquaic 1, 36-9-32, dr sand and shale 1512 ft. Barnsdall's Pezzoni 1, 15-8-32, bailing top fluid 2000 ft, td 4494 ft. Petrol Corporation's Magenheimer 5, 9-8-32, recompleted on pump 260 bbls daily 50% cut, 4714 ft. J. E. O'Donnell's Helen 1, 8-7-33, testing 7-inch water shutoff, 4998 ft. Continental's La Laguna 2, 25-8-31, dr sand and shale 5162 ft. General Petroleum's La Laguna 1, 6-7-30, dr hard shale 3606 ft. Trans-Oceanic Oil's Mdivani 1, Santa Barbara Mesa, sanded up, co 1950 ft. **San Luis Obispo**—California Petroleum's Job 1, 6-10-24, sd 2210 ft; Same, Iron 1, 19-10-24, owdd 1710 ft. Harry E. Lee's Defiance 1, 7-32-22, sd 290 ft. Temblor Oil's Temblor 1, 22-31-21, sd 3465 ft. Western Plains' Bell 1, 7-31-21, sd 4010 ft; Same, Bell 2, 2-32-21, sd 2620 ft. Loma Grande's Luis 1, 28-31-13, sd 2125 ft. Vanguard Oil's Clark 1, 26-27-14, sd 4951 ft. Epco Inc., Epco 1, 27-26-13, dr hard shale 1285 ft. **Ventura**—High Mesa's Butcher 1, 16-4-22, dr shale 1740 ft. Claran Oil's Hardison 1, 22-4-20, dr very hard shale 710 ft. Commander Oil's No. 7-F, 13-4-19, redrilling 575 ft, td 575 ft. Charles R. McKinnis' Cosley 1, 14-4-19, sd 1090 ft. Merchants Petroleum's Cochrane 8, 1-4-20, r oil sand 1365 ft. St. Louis Oil's Williamson 1, 1-4-20, dr red shale 1258 ft. El Rancho Oil's Elkins 2, 9-3-19, foundation. Texas Co.'s Shiells 135, 4-3-19, wocs 4066 ft. Albatross Oil's Scheiferle 1, 17-3-20, rig. Clipper Oil's Calco 1, 17-3-20, rig. Section 20's No. 1, 20-5-19, dr shale and sand 2315 ft. Hardison & Temple's No. 1, 22-4-21, wocs 656 ft. J. W. Martin's Arnett 1, 15-4-21, sd 1230 ft. Stallings, Senter & Ahlburg's Stallings 1, 24-4-21, co 720 ft, pumping water, td 1445 ft. Ventura Drilling's Canet 1, 10-3-23, dr sand and shale 1560 ft.

NORTHERN CALIFORNIA

Colusa—Amerada Petroleum's C.L.C. 1, 34-16-1, will test 3190-3210 ft, td 8152 ft. **Humboldt**—Texas Co.'s Eureka 2, 22-3-1, developed potential of 494,000 cubic feet of gas, some mud 7708 ft. **Monterey**—A. A. Anderson's Hillman 1, 15-24-14, co 4004 ft. L. B. Tannehill's Quinn 1, 35-20-8, dr hard sand 2010 ft. **Solano**—Richfield Oil's Potrero Hills 1, 10-4-1, co 5334 ft. **Stanislaus**—Orestimba Oil's Simon Newman 1, 12-7-7, sd 790 ft.

COLORADO

Elbert—Plymouth Oil Co.'s Brosky-Union Pacific 1, csw sw 19-10s-60w, sd 6809 ft. **LaPlata**—Nick Spatter's Bryce 1, se sw sw 31-33n-9w, dr 2180 ft with sg 2140 ft. **Moffat**—Mackinnie Oil & Drilling Co.'s Coles 1, sw sw se 1-3n-92w, underreaming to set pipe below Dakota, total depth at 3032 ft in Morrison. Isenberg, Parker & Myers, Myers-State 1, nw se ne 36-4n-103w, dr 165 ft. **Park**—South Park Oil Co.'s Lemarr 1, ne ne se 34-11s-75w, dr 6450 ft. **Pueblo**—Eden Oil & Gas Co.'s Horse Creek Land & Cattle Co. 1, sw se 29-19s-64w, dr 1870 ft. **Rio Blanco**—Buford Oil Co.'s Government 1, csw sw 16-1n-91w, co 3452 ft. **Routt**—Steamboat Springs Syndicate's Brown 1, cnw ne 1-6n-86w, dr 1640 ft. Craig, Moore et al's Irwin 1-X, csw ne 33-7n-85w, sd 160 ft for winter.

FLORIDA

Levy—Fla. Discovery Oil Co.'s Sholtz 2, sw sw ne 9-15s-13e, top chalk 3110 ft, gas odor 3853 ft, coring 4020 ft. **Nassau**—St. Mary's River Oil Corp.'s Hilliard Turpentine Co. 1, nw nw se 19-4n-24e, elev 110 ft, dr plug, td 4508 ft. **Polk**—Edw. A. Hill's Polk County Lbr. Co. 1, nw nw ne 32-25s-25e, dk. **Suwannee**—J. W. Phillips Oil Expl. Co.'s Shilkett 1, nw nw 14-4s-14e, spd and sd. Wm. G. Blanchard's Lucy Cotton 1, se ne 35-3s-11e, sd for heavier rig 203 ft.

KANSAS

Barton—Long & Johnsons Eveleigh 1, sw ne 3-18-14w, dr 3010 ft. Newton & Clyde et al's Hagen 1, sw 20-20-11w, wocs 196 ft. **Cowley**—Henderson's King 1, nec 22-31-4e, dr 400 ft. Grallapp & Continental Oil Co.'s Community 1, nwc 23-32-5e, co, pb 680 ft. **Dickinson**—Franks et al's Huffman 1, nw sw 11-13-1e, dr 1275 ft. **Ellis**—Sinclair-Prairie Oil Co. et al's Prusa 1, sec 20-16-11w, rur. **Grant**—Panhandle Eastern Gas Co.'s Towler 1, c

ABBREVIATIONS

The following abbreviations, signs, etc., are used in completions and wildcat reports in THE OIL WEEKLY.

*—*dry hole abandoned well.*
‡—*salt water (completions).*
†—*junked and abandoned.*
¶—*million feet of gas.*
abd—*abandoned.*
bbls—*barrels.*
br—*building rig.*
bs—*basic sediment.*
csg—*casing.*
co—*cleaning out.*
dd—*drilling deeper.*
dk—*derrick.*
dr—*drilling.*
fsg—*fishing.*
ft—*feet.*
hfw—*hole full of water.*
in—*inches.*
lcn—*location.*
m—*milling.*
mim—*moving in materials.*
mit—*moving in tools.*
mot—*milling on tools.*
n, s, e, w—*north, south, east, west.*
oih—*oil in hole*
owdd—*old well drilling deeper.*
owpb—*old well plugging back.*
pb—*plugged back or plugging back.*
r—*reaming.*
rog—*rig on the ground.*
rur—*rigging up rotary tools.*
rust—*rigging up standard tools.*
sd—*shut down.*
sdtr—*sidetracking.*
sg—*show gas.*
si—*shut in.*
so—*show oil.*
so&g—*show oil and gas.*
spd—*spudding.*
sr—*straight reaming.*
sw—*salt water.*
td—*total depth.*
ur—*underreaming.*
wih—*water in the hole.*
wo—*workover.*
wocs—*waiting on cement to set.*
wosr—*waiting on standard rig.*

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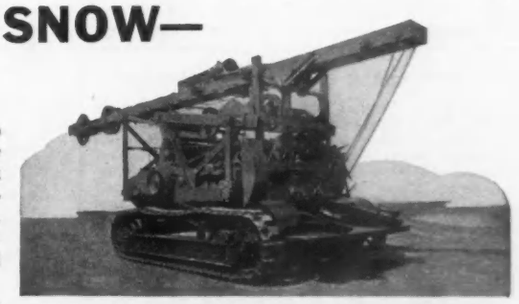

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se¼ 20-30-37w, testing, td 2793 ft. Panhandle Eastern Gas Co.'s Parsons 1, c n½ sw 25-30-37w, dr 2375 ft. **Greenwood**—Dunlap's Mortgage 1, nw sw 4-28-10e, sd 2155 ft. **Harvey**—Derby Oil Co. & Gary Drlg. Co.'s Jones 1, cel ne nw 7-22-1w, td 3277 ft. **Kingman**—Duwe & Farris et al's Kimminan 1, ne nw sw 12-30-9w, sd 127 ft. **Marion**—Cox & McGinnis & Saco Oil Co.'s Jolliffe 1, c s½ sw se 2-22-5e, sd 1375 ft. **McPherson**—Marylyn Oil Co.'s Dixon 1, nw ne nw 7-19-2w, wocs 2770 ft. **Ness**—Carlock & Cullum's Smith 1, c sw se 11-17-25w, dr 3835 ft. **Ottawa**—Babcock's Copeman 1, cnl s½ s½ se 7-10-2w, dr 2695 ft. **Rice**—Glimac Oil et al's Malone 1, se sw nw 36-20-10w, ur 7-inch 3361 ft. Virginia Drlg. Co.'s Clawson 1, sw nw 17-20-11w, rur. **Rooks**—Producers' Ham 1, sw nw 25-7-19w, ur 8-inch 2355 ft. Phillips Pet. Co.'s Tangey 1, 25-8-18w, rust 3423 ft. Darby Pet. Corp.'s Peavey 1, nw ne 24-11-18w, rur. **Rush**—Cities Service Oil Co.'s Hall "B" 1, 2-12-17w, pits. **Russell**—Nelson's Polcyn 1, sw 31-13-15w, dr 350 ft. Phil-Han's, Inc. Weimeister 1, sw 18-14-13w, dr 2355 ft. Yankey & Stearnes' Krog 1, nw se nw 7-15-13w, dr 3035 ft. Southern's, Inc. Sellens 1, swc 22-15-13w, testing, td 3329 ft. Western Kansas Oil & Refg. Co.'s Mochel 1, cel sw 1-15-14w, dr 450 ft. **Sedgwick**—Crowe et al's Murphy 1, sw se 34-29-1w, dr 3700 ft. **Sumner**—Cameron & Spencer's Frey 1, nwc 5-30-1e, dr 2625 ft. **Thomas**—Ramsey Pet. Co. & John Mabee's Ryan 1, c ne se 27-8-32w, dr 5310 ft.

SOUTH LOUISIANA

Assumption—Humble's Milliken & Farwell 1, Labadieville area, 15-14s-14e, dk. **Avoyelles**—Magnolia's Bowden 1, Evergreen area, 7-2s-4e, abn 9014 ft. **Calcasieu**—Humble's Miller 1, Chalkley area, 32-11s-6w, dr shale 5610 ft. **Cameron**—Federal Royalty Co.'s State 2, Calcasieu Lake area, 13s-9w, driving piling. Pure's Calcasieu National Bank 3, Lowry area, 19-12s-4w, dr shale 5810 ft. **Iberia**—Texas Co.'s State 5, Fausse Point, 35-11s-8e, dr shale 7304 ft. **Iberville**—California Co.'s Schwing Lbr. & Shingle Co. 1, Bayou Sorrel area, 96-10s-10e, canal. Humble's Wilbert 1, Bayou Des Glaise area, 78-8s-8e, lcn. **Lafourche**—Texas Co.'s LaTerre 1, Golden Meadows, 1-20s-21e, woc 9290 ft; same operator's State Catfish Lake 1, Golden Meadows, 77-19s-21e, drill sand 1002 feet. **Orleans**—W. T. Burton's State 1, in Lake Ponchartrain, 10s-13e, dr shale 9213 ft; same operator's Faubourgde Monteluzin 2, Lake Ponchartrain, 11s-13e, dr sticky shale 8756 ft. **St. Bernard**—Gulf's State RR 4, Lake Borgne, 12s-15e, dr shale 7209 ft. Vendome Pet. Corp.'s Kennelworth 1, Shell Beach, 59-13s-14e, ru. **St. James**—Shell's Schexneyder 1, LaPice area, 38-12s-15e, wor. **St. Landry**—Herton's Thistlewaite Lbr. Co. 1, Beggs area, 60-4s-4e, dr shale 11,119 ft. **St. Martin**—Shell's Burdin 1, West Lake Verrett, 15-14s-12e, preparing to make a drill stem test at 9540 ft. Texas Co.'s St. Martin Land Co. 11, Henderson, 21-8s-7e, sd 9404 ft; same operator's State 6, Lake Mongouloui, 10-10s-9e, dr shale 9919 ft. **St. Mary**—St. Mary Oil Co.'s Hebert 2, 31-13s-9e, dr shale 3300 ft. **Terrebonne**—Shell's Peters 1, s of Houma, 73-18s-18e, comp 18½ bbls per hour 10,308 ft. Texas Co.'s Continental Land & Fur Co. 1, Lake DeCade, 29-18s-14e, dr shale 9826 ft in sdtr hole; same operator's State 2, Calliou Bay, 22s-14e, repairing fd at 2851 ft.

NORTH LOUISIANA

Bienville—Ark. La. Gas Co.'s Davis Lbr. Co. B-1, sw nw sw 7-16n-4w, elev 295 ft, chalk 2526-2791 ft, massive anhydrite 5393-5639 ft, tested est. 50 mil ft in drill stem test 5844-76 ft, ¼ in chokes top and bottom, 255 lbs. pressure, tested sw 6185-6203 ft, dr 7101 ft shale strks hd sand; Gayoso 2, sw se 14-16n-10w, mim. Producers O&G Co.'s (Will Hall), Graves-Thomas 1, se sw se 23-15n-10w, woc 180 ft. **Caddo**—Ark. Fuel Oil Co.'s F. F. Webb 1, c nw sw 4-16n-13w, elev 168 ft, dr 4065 ft, shale and lime. Colonial Corp.'s Thigpen-Herold 1, ne sw 34-22n-16w (6000 ft test), dr 3480 ft. R. L. Bauman et al's Slattery 1, c nw nw 35-18n-14w, elev 172 ft, massive anhydrite 4331-4593 ft, top Pettet 5541 ft, 20 ft saturation 7-in csg set on bottom 5596 ft, completed 192 bbls oil daily. J. Thomas Driscoll's Woolworth 1, se se 19-18n-14w, spd woc surf csg. Hall & Smith's Fee 1, se ne 5-17n-14w, lcn. Harry Hanbury's Loe 1, se sw 23-18n-14w, lcn. C. D. Loe's Lionel Meyer 1, sw se 33-18n-14w, elev 224 ft massive anhydrite 4390-4660 ft, tested sw, pb to test again, td 5632 ft. Rodessa O&R Corp.'s Chandler 1, c sw ne 34-18n-14w, blew out in Tokio 2420 ft, est 10-15 mil ft gas, setting 7-in csg on bottom, td 5590 ft. J. Weil's Dreyfuss 1, sw sw 20-18n-14w, lcn. R. O. Carter et al's Marks Meyer 1, 34-18n-14w, lcn. R. E. Allison's Mabry-Jones 1, 21-18n-14w, rur. Ellerbe 3, sw ne 28-18n-14w, mim. J. T. Parks et al's Grayson 1, se se 30-19n-15w, woc surf csg. **Caldwell**—Oakes et al's Kyle 1, ne sw ne 18-11n-3e, sd 470 ft. **Catahoula**—Sibley-Sabine Oil Corp.'s Peck 1, 36-10n-8e, sd 2020 ft. **Claiborne**—E. T. Oakes et al's E. C. Kilgore 2, nw se 28-21n-5w, cored 9 ft sat Pettet lime, 7-in csg 5288 ft, made 20 bbls oil hour before acidizing, flowed 40-50 bbls hr after acidizing, casing parted, recemented csg, td repr leaking tubing, td 5317 ft. **De Soto**—Samuel S. Alexander's Stell A-1, ne ne 5-12n-16w, elev 252 ft, top Washita 2710 ft, made est 2 mil ft gas and flowed oil intermittently, pumped 3 to 5 bbls oil daily, arr deepen, td 2761 ft. **Madison**—Continental Oil Co.'s Singer Mfg. Co. 2, c 2-15n-11e, dr 2804 ft. **Natchitoches**—Jos. E. Popkins' Peavy-Wilson Lbr. Co. 1, 36-7n-9w, sd 300 ft. **Red River**—Magnolia's J. C. Pugh 59, se nw 12-12n-11w, elev 140 ft, top lower Cretaceous 2592 ft, top anhydrite 4725 ft, dr 5355 ft, shale and hd lime. N. W. Hunter et al's Le Long 1, nw nw 33-12n-10w, sd repr rig 1000 ft. **Sabine**—Earl Fox et al's Cook Ld. Co. 1, se nw 1-9n-12w, owdd 3655 ft. LeGrande et al's Tatum 1, nw ne 17-8n-13w, acidized, testing 700 ft oil, td 2340 ft. Tropical Oil Co.'s Long-Bell 1, 5-8n-13w, arr deepen 3507 ft. Zwolle Synd.'s (Moffitt et al), Mansfield Hdw. Co. 1, ne ne 8-7n-14w, perf 3860-86 ft, tested dry, arr pb and perf again, td 4325 ft. Geo. L. Pace's Logan 3, sw nw 26-10-13, acidized, wosr, td 1952 ft. **Tensas**—H. B. Schumacher's Mounds 4, 39-11n-12e, sr, td 2450 ft. **Webster**—Magnolia's Pardee C-1, c nw ne 17-23n-11w, elev 203 ft, swabbed dry, so 6025 ft, top Travis Peak 6054 ft, top lower Marine 7998 ft, cored 6 ft sand so 8504-10 ft, dr 9435 ft, sand and shale. Magnolia's H. M. Branton 1, ne sw ne 6-22n-9w, elev 226 ft, top anhydrite 4225 ft, dr 4940 ft, shale. Roseberry-Bailey 1, se 29-23n-9w, lcn. Sibley-Sabine Corp.'s McDonald 1, nw nw 32-17n-9w, elev 232 ft, top Nacatoch 1197 ft, chalk 1415-1730 ft, top Tokio red beds 3169 ft, dry abn, td 6279 ft. Union Prod. Co.'s Walker-Morgan 1, c se 30-18n-8w, cemt 13⅜ in csg, woc 1413 ft (9000 ft test).

MICHIGAN

Allegan—Cook's Stevens 1, 12-1n-16w, dr 175 ft, Varner's Vanderkolk 1, 21-3n-12w, dr 1700 ft, shale. Kirkham's Manson 1, 21-1n-15w, spudded. Rex's Nelson 1, 36-1n-15w, dr 1190 ft. Haze's Overbeck 1, 10-3n-15w, dr shale 1300 ft. Sowell's Arbanas 1, 8-3n-11w, sd 1500 ft. **Arenac**—Bartlett's Clement 1, 6-18n-4e, dr Traverse lime 1990 ft. **Barry**—Schelling's Smith 1, 9-1n-8w, lcn. Collin's Simmons 1, 3-4n-10w, Traverse 1870 ft, so 1940 ft, sd 1942 ft. Yankee Springs' Royes 1, 14-3n-10w, dr 340 ft. **Calahoun**—Verona's Fruin 1, 29-1s-7w, sd 2300 ft. **Clare**—Daily Crude Oil Co.'s Thomas & Hand 1, sw nw ne, 28-20n-6w, dr 1590 ft. Huges' Frackleton 1, 18-18n-5w, dr 556 ft. **Clinton**—McDonald's Koeppen 1, 19-6n-3w, dr 2457 ft. **Crawford**—Weber Oil Co.'s Floeter 1, 31-25n-1w, fsg 624 ft. **Gladwin**—Bridger Basin's State 1, 29-19n-2e, dr 3016 ft, hfw, lime and shale. **Huron**—Leonard Prospecting's Milling Co. 1, 10-16n-15e, dr 4360 ft, shale. Teater's Kerr 1, 27-16n-13e, dr 1455 ft. **Isabella**—Gulf's Hauck 1, 13-15n-5w, dr 1690 ft. **Leelanau**—Lupher's Wilce 1, 34-28n-14w, dr 565 ft. **Mackinac**—Van Kuren's Hiawatha 2, 27-44n-9w, dr 740 ft. **Midland**—Weller's Hepinstall 1, 9-13n-2e, fsg 1550 ft. Andrews' Harris 1, 14-16n-1e, rig. **Missaukee**—Moser's Scherenhelm 1, 36-23n-7w, dr 660 ft. **Ogemaw**—Caldwell's State 9, 6-21n-3e, fsg 1820 ft. Rowmor's McBain 1, 27-21n-1e, dr 3000 ft. **Osceola**—Champion's Ealy 1, 30-20n-8w, sd 840 ft. Franklin's Johnson 1, 26-19n-7w, dr 2690 ft. Michigan Devonian's Reddy 1, 10-18n-7w, rig. **Otsego**—Summer's Geraldine 1, 28-30n-3w, sd 1700 ft. Snow's Moore 1, 13-29n-2w, dr 2100 ft. **Ottawa**—McClanahan & Chapman's Kooyers 1, 2-5n-15w, dr 200 ft. **Saginaw**—Darke's Bell 1, 31-12n-3e, dr 2200 ft. **Van Buren**—Gulf's Verecke 1, 27-4s-15w, dr 450 ft. Ross & Leman's Landrus 1, 11-1s-15w, Traverse 1168, so 1170, td 1173 ft, testing. Messel's Conkling 1, 26-4s-16w, dr 390 ft.

MISSISSIPPI

Calhoun—L. C. Lucas' E. C. Boland 1, sw se 9-22n-9e, top Selma chalk 738 ft, arr deepen, td 760 ft hd gumbo. **Clarke**—J. L. Ryan's C. C. Eddins 1, sw sw 29-2n-14e, rur. **Claiborne**—Claiborne County Dev. Co.'s Ruth Hayden 1, s½ se 55-11n-2e, owdd 2950 ft. **Hinds**—Cleve Love et al's S. F. Johnson 1, ne se 29-6n-1w, elev 343 ft, dr 4807 ft hd red shale, streaks white shale. G. Jeffrey's Gaddis Farms 1, nw se 26-7n-4w, sd 3448 ft (Wilcox). **Montgomery**—Dr. T. A. Chichester et al's E. C. Mitchell 1, se nw 30-20n-7e, dk. **Simpson**—Cleve Love et al's N. E. Garner 1, sw ne 1-10n-17w, dr 150 ft. **Yalabousha**—Chas. W. Crader's Jno. Bruce James 1, ne ne 24-11s-6w, spd and sd to complete, rur. Griffin & Melvin's Smith-Warren 1, nw se 6-24n-6e, mim.

MONTANA

Carbon—R. C. Tarrant's 2, se nw 4-6s-19e, fsg 2410 ft. **Fergus**—Emmons et al's Stocker 5, sw nw sw 24-22n-18e, dr 650 ft, owdd. **Phillips**—Treasure State Oil Pool's Government 1, cse sw 3-24n-23e, abd 1100 ft. **Teton**—Gulf States Oil Co. & Zodiac Oil Co.'s Kel-

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logg 1, ne nw ne 23-28n-5w, dr 375 ft. Wallenstein 1, sw sw sw 5-27n-5w, fsg 2525 ft. **Yellowstone**—Signal Oil & Gas Co.'s Stoltenberg 1, ne ne sw 18-3n-23e, sd 4955 ft.

OKLAHOMA

Alfalfa—Acre & Lee's Atchison 1, c nw ne 13-24n-11w, rog. **Beckham** — McWhirter's Fee 1, nw sw sw 34-8n-19w, co 2174 ft. **Cleveland**—Nels-Burrton's Hirsch 1, nwc ne 17-9n-2w, to pb, td 7695 ft. Big Chief Drlg. Co. & Gulf Oil Corp.'s Strategier 1, nwc sw 25-9n-2w, to drill plug, td 7175 ft. **Grady**—Carter Oil Co. et al's Smith 1, c se sw 25-5n-8w, dr 5200 ft. **Hughes**—Phillips Pet. Co.'s Beeker 1, ne nw sw 8-5n-10e, td 5639 ft, testing. Phillips Pet. Co.'s Mandler 1, se sw sw 1-6n-10e, dr 3845 ft. Wood's Aldridge 1A, sw nw ne 5-8n-8e, mirt. **Jackson**—Lippert et al's Howard 1, ne sw nw 10-3n-19w, dr 1535 ft. **Kay**—Hamilton's Riddle 1, nwc 3-26n-4e, dr 2250 ft, Crawford et al's Biehl 1, sec nw 34-27n-2w, dr 617 ft Atlantic O. & Refg. Co.'s Watson 1, sec nw 28-28n-1w, dr 3680 ft. Tidewater Associated Oil Co.'s Hickman 1, nwc ne 19-28n-1e, preparing to bail, td 3448 ft. Little's Prunty 1, nec sw 33-28n-3e, testing, td 324 ft. Blosser's Rodolph 1, nec sw 27-29n-1w, dr 3615 ft. **Kingfisher**—Gutowsky et al's Lankford 1, nec se 34-17n-6w, pits. **Kiowa**—Emerson's Handcock 1, sec ne 26-6n-15w, sd 480 ft. **Lincoln**—Summit Drlg. Co.'s Gordon 1, nec 27-17n-2e, td 4835 ft, coring ahead. **Noble**—Phillips Pet. Co. et al's Robertson 1A, nw ne sw 29-24n-1w, dr 2935 ft. **Okfuskee**—Mead Production Co.'s Pine 1, swc nw 14-12n-11e, dr 2635 ft. **Pawnee**—Kelly's Hill 1, swc se 1-21n-5e, sd 870 ft. **Payne**—Starr et al's McKenzie 1, swc ne 13-18n-3e, mirt. **Pontotoc**—Casey's Pace 1, swc ne 14-2n-7e, rog. **Pottawatomie**—Hall & Briscoe's Merkle 1, nwc se 32-8n-5e, co 4380 ft, testing. **Seminole**—Simpson-Roodhouse's Watson 1, se ne sw 11-6n-5e, dr 2815 ft. Atlantic Refg. Co.'s Atkinson 1, nwc sw 17-6n-6e, lcn. **Sequoya**—Thompson Bros'. Ruby 1, nwc ne 30-12n-22e, lcn. **Stephens**—Phillips Pet. Co.'s Culbertson 1, nwc se 4-1n-5w, cellar. **Washita** — Continental Oil Co.'s Proctor 1, c nw¼ 28-10n-20w, dr 9275 ft.

SOUTH TEXAS

LAREDO DISTRICT

Bee—Aid's Hall 3, Kerr sur, dr plugs, testing, depth 3574 ft. Chapman Minerals' Ablinger 1, Ryan sur, set casing around 5841 ft. Dirks' Robertson 1-A, Morrow sur, dr 1000 ft. **Duval**—Cox & Hamon, Gorman-Yoakam's Gonzales 1, sur 114, lcn. Fansler's Benavides 1, El Mesquite gr, lcn. Magnolia's Duval Ranch 2, sec 189, dr below sur csg; Duval Ranch 1, sec 101, dr below sur csg. Miller's Miller 1, Santos Flores gr, sp. O'Hern's Benavides 1, sur 169, drlg, no details. S. K. & C.'s Welder 2, sur 103, sp. **Goliad**—Bennett's Ray 1, Ray sur, dr 1650 ft. English' Wiess 1, Litts sur, dr 3860 ft last rept. Steinberger's Alberecht 1, Hancock sur, testing, 5313 ft. **Jim Hogg**—Humble's Bass 3, San Rafael gr, cor below 4750 ft. Pierce's Yeager 1, sur 20, lcn. **Karnes**—Fomax' Pfluger 1, Seguin sur, dr 1600 ft. **La Salle**—Lake-Tobian's O'Connor 1, Emory sur 988, fsg for ds, depth 2915 ft. **Live Oak**—Southwest's Hill 1-A, blk 20, Simmons subd, dk, ru. **McMullen**—Shumway & Burns' Shiner 2, sur 4, testing snd 1452-62 ft. **Starr**—Circle's Olivares 1, sur 241, woo, may set csg, depth 4696 ft. DeWitt's Alvarez 1, por 72, dr 200 ft. Giblin's Guerra 1, por 69, dr wtr well. Hall & Schmidt's Margo 1, por 70, dr 1225 ft. Sun's Olivares 1, sur 239, cor 5600 ft. Transwestern's Dallas 1, sur 226, dr below sur csg. **Webb**—Houser & Campbell's Puig 1, Albercas gr, cor 2108 ft. Killam's Bruni 2, Albercas gr, dr 1320 ft. Speer's Benavides 1, Arispe gr, ru, prep sp. **Zapata**—Martinez' Laurel 1, Borrego gr, cor 940 ft. Thompson's Ramirez 1, por 18, dr 1820 ft last rept.

CORPUS CHRISTI DISTRICT

Brooks—Lanning & Coffield's Mestina 1, Gonzalena gr, dr below sur csg. **Calhoun**—Hiawatha's Roemer 2, Ogsberry sur, dr 9560 ft. **Hidalgo**—Phillips' Flores 1, por 39, dr 9600 ft. **Jackson**—Chapman Minerals & Cartter-Rubsamen & Norsworthy's Bennett 1, Garcia gr, lcn only. Crosby's Broughton 1, Green sur, lcn. **Jim Wells**—Graham & Mosser's Bankers 1, La Vaca gr, dr 3655 ft. Graham's Hirsch 1 Stanfert sur, sp. Magnolia's Maun 1, Ignacio de la Pena gr, prep sp. Sal Viejo's Shaeffer 1, sur 8, cor below 4250 ft, last rept. Shell's Blucher 1, Best sur, cor 7430 ft. Transwestern's Dunlap 1, sur 181, completing through perfs 5365-70 ft; Seeligson 1, sec 71, Haldeman subd, dk, wo contractor. **Kleberg**—Pure's State 1, tr 522, squeezed betwn strings of csg, wocs, depth 9636 ft. **Nueces**—Humble's Michalek 1, sec 97, dr 5400 ft. Phillips' Mastin 1, sec 146, woo, depth 7765 ft. Seaboard's Wilson 1, Herrera gr, dr 5090 ft. Stanolind's Clark 1, Herrera gr, dr 5060 ft. Texas' Little 1, sur 59, fsg 7746 ft. **Refugio**—Hewit & Dougherty's Rooke 1, Aldrete gr, dr 5000 ft. **San Patricio**—Graham's Moore 1, McCampbell Ranch subd, dr 4700 ft. **Victoria**—Wellington's Boothe 1, J. RR Co sur, woo, depth 4320 ft.

SAN ANTONIO DISTRICT

Atascosa—Stanley's Schumann 1, Malone sur, testing, depth 1722 ft. **Bastrop**—Franklin's Thaxton & Yarrington 2, Bangs sur, dr 2134 ft. Tarver's McDuff 1, Wilbarger sur, dr 2515 ft. Teas, Ashley, Hinton's Grizzard 1, Graham league, prep perf 7023-30 ft, depth 7177 ft. **Bexar**—Blackburn's Miller 1, sur 324, woo, 479 ft. Le Comte's Herbst 1, Leal sur, dr below 970 ft. Currie & Crowder's Miller 1, sur 324, dr 50 ft. Philtop's Patton 4, Rodriguez sur, dr, no details. Wagner's Lamm 1, sur 3, lcn. **Blanco**—Johnson's Glasscock 1, sur 50, will dd below 500 ft after being taken over by new operator. **Caldwell**—Dye's Voight 1, Watkins sur, sd 2747 ft. Lincoln's Mebane 1, Berry sur, lcn. Nytex' Bridges 1, Floyd sur, sd in brkn ch, depth 2710 ft. **Frio**—Humble's McLean (Houston) 1, sur 162, dr below 5200 ft; Schley 1, still testing on pump, td 5309 ft, pb-td 4800 ft. Smith's Berry 1, sur 1, dr 3900 ft. **Guadalupe**—Hamill & Hamill's Tewes 1, Duran sur, dr 100 ft. Huener's Bauer 1, Brown sur, sd in sh at 1017 ft, wo csg. Wellington's Mattke 1, Smith sur, dr below sur csg. Williams' Weber 1, Torres sur, testing, 1483 ft. **Kendall**—Carpenter's Seidensticker 1, sur 257, sd at 571 ft. Comfort's Seidensticker 1, sur 18, sd 545 ft. Graham's Werner 1, sur 781, dr 650 ft. Reed's Marquart 1, Traviesso sur, dr 900 ft. **Kerr**—Hart & Howell's Love 6 (5-E), Martinez sur, cleaned out to 2600 ft, td 5625 ft. **Kimble**—Plateau's Bolt 1, sur 42, td 1863 ft, pb td 1435 ft, testing on pump; Davis 1, sur 44, dr 950 ft last report; Hunger 1, sur 43, testing, 1837 ft. **Kinney**—Rose' Gaebler 2, Beales sur, dr 200 ft. Wardlow & Magnolia's Fee 1, Valdez gr, lowered csg to 1100 ft, td 1290 ft. **Lee**—Pederson's Brown 1, Hudson sur, cor below 6140 ft. **Medina**—Brown's Davis 1, Patilla sur, dr ch 1530 ft. Gannon's Saathoff 1, sur 844, dr 900 ft. **Real**—Hart & Howell's Love 1, HE&WT sur, fsg for ds. **Williamson**—Midwest's Terchelman 1, Jett sur, dr sh & lime, 3500 ft. **Wilson**—Stapper's McDaniel 1, Manchaca sur, still fshg 3061 ft.

EAST TEXAS BORDER COUNTIES

Harrison — R. S. Barnwell's Mrs. Luther Smith 1, A. D. Hope sur, elev 185 ft, dr 2385 ft. **Marion**—Vestal et al's Moseley 1, D. Lane sur, rur. **Panola**—E. P. Pewitt et al's Rushing 1 (751-ac), Mannan Smith sur, lcn. McDonald and Campbell's J. F. Nail 1 (61-ac), Cyrena McCreary sur, rur. **San Augustine**—Superior's Long Bell 1, S.P. RR sur, rur. **Shelby**—Grady H. Vaughn's Pickering Lbr. Co. 1, Brooks sur, dr 4950 ft. Redditt et al's Pickering Lbr. Co. 3, Snyder sur, 10-in csg 1189 ft, gas blowout at 4870 ft, testing csg, td 5080 ft.

TEXAS GULF COAST

Brazoria—Humble's Masterson 1, Anchor area, Geo. Robinson sur, dr shale 6002 ft; same operator's Tuttle 1, Iowa Colony area, H.T.&B. No. 67, dr sandy shale 6068 ft. **Chambers**—F. A. Gillispie's Kirby Pet. Co. 1, West Cotton Lake area, Chambers County School Land sur, abn 6523 ft. **Galveston**—Sun's Humphreys 1, Bolivar prospect, R. Barrow sur, running electrical survey at 8206 ft. H. C. Cockburn's Haardt 1, n of discovery well at League City, F. Austin sur, dr shale 8100 ft. **Harris**—Carroll Oil Co.'s N. Means 1, Pearland area, T. J. Green sur, dr shale 2834 ft. C. L. Dobbin's Ridgeview Farms 1, nw of Cypress, I. B. Steele sur, woc 849 ft. Jack Frazier's Carter Investment 1, Highland area, T. Patchings sur, lcn; same operator's Hornberger 1, Highlands area, B. N. Sessuins sur, dr shale 3610 ft; same operator's Griffith 1, Mt. Houston prospect, A. Smith sur, coring shale 7828 ft. **Jefferson**—British American and Merit Oil Co.'s Gladys City 1, w of Spindletop, J. A. Veatch sur, sdtr 3000 ft. Humble's McFaddin B-13, Jefferson Coast, in Gulf of Mexico, dr shale 2364 ft; same operator's Todd 1, w of Cheek, Wm. Carr sur, woc 7719 ft. **Montgomery**—Deep South's Foster Lbr. Co. 1, ne of New Caney, P. Bryan sur, sd 6985 ft. Housh & Thompson's Clary 1, nw of Conroe, W. S. Allen sur, sd 4739 ft. **Orange**—Sun's Lutcher Moore 1, north of Orange, B. Johnston sur, dr shale 8047 ft. **Trinity**—Texas Long Leaf Lumber Co.'s Thompson Lbr. Co. 1, nw of Trinity, J. Ortego sur, dr shale 1431 ft. **Wharton**—Crown Central's Babcock 1, w of Louise, S. P. Middleton sur, dr shale 4450 ft. Humble's Duncan 1, Hungerford area, A. Edgers sur, dr shale 7841 ft.

WYOMING

Big Horn—V. M. Kirk's Frisby 1, csw se 11-49n-94w, dr 750 ft. Prescott & Mileski's Government 1, ne nw sw 1-51n-93w, woc 1027 ft. A. L. Rankin's Karjala-Rankin 1, csw nw 10-54n-94w, sd 577 ft. **Carbon**—Cunningham Oil Co.'s Union Pacific-Fee 1, nw se ne 21-22n-78w, dr 1030 ft. **Converse**—John Ackard's Carey 1, sw nw sw 19-33n-73w, dr 210 ft. **Niobrara**—Cow Gulch's Magoon 1, ne ne sw 33-35n-64w, dr 500 ft. **Weston**—John Brorby's George 1, sw se nw 12-47n-64w, dr 2240 ft. James Farrel's 1, ne se se 2-44n-61w, dr 74 ft.

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DARCOVA (Orange Label) the standard for over thirty years under severe service at all depths.

DARVAL (Blue Label) for service in wells to approximately 2000 feet in depth.

DARFLEX (Green Label) the popular favorite for wells to 800 feet in depth.

SEATING CUP (Cut away to show section)

SEATING RING (Cut away to show section)

Our Seating Cups and Rings are made from the same fine materials —and by the same careful methods —as Darcova, Darval or Darflex Valve Cups. Available in "Regular," "+15," and "+30" sizes.

Manufactured Only By

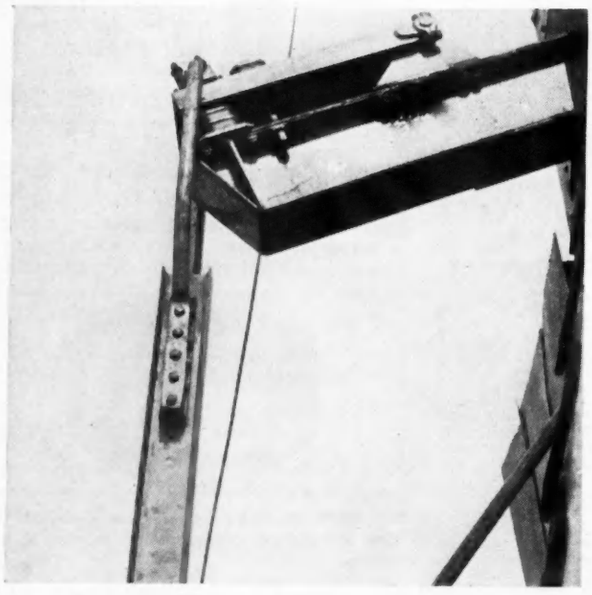
DARLING VALVE & MFG. CO.

Williamsport, Pa.

NEW PRODUCTS FOR THE FIELD
Machinery • Tools • Equipment

WALKING BEAM SHOCK ABSORBER
The National Supply Company

A walking beam shock absorber for National Drilling Machines has recently been placed on the market by The National Supply Company. This is designed to protect the machine from the shock of direct wire line drilling and to eliminate the necessity of a manila cracker.



National Walking Beam Shock Absorber

The shock absorber is simple in construction and easily installed. It consists of a pitman bearing carried on four rubber cushions, which absorb the drilling shock, with a single cushion for taking the rebound. The amount of compression is adjustable by means of adjusting bolts.

DIESEL CRANK CASE CLEANER
Oakite Products, Inc.

A newly developed method of cleaning Diesel engine crank cases that is said to eliminate the long laborious scraping and wiping of surfaces incidental to hand methods used heretofore, is announced by Oakite Products, Inc., New York, N. Y. It is reported that with this method, the operation can now be handled effectively with substantial savings in time and effort.

This new method is used in conjunction with a recently developed oil soluble emulsifier, Oakite Composition No. 9, which, due to providing high emulsifying qualities and rapid penetrating action, makes possible fast, effective removal of sludge, grease and carbonized oil deposits. It is used with kerosene or light fuel oil.

The mixture is sprayed on crank case surfaces and allowed to soak for a one- to three-hour period, depending on the condition of the crank case. After sludge, grease or other accumulations have been thoroughly softened and loosened, they are flushed away with a high-pressure rinse, which completes the operation.

NON-FLOOD DEVICE FOR BATTERIES
The B. F. Goodrich Company

A new non-flood device for automobile storage batteries, to meet problems created by the modern practice of putting the battery under the hood has been developed by its engineers, it is announced by The B. F. Goodrich Company, Akron, Ohio.

According to the manufacturer a battery equipped with this device removes all fear that costly damage will come to engine parts through over-filling.

Three hard rubber parts, a barrel with two air vents, vent cap and specially designed cell cover, make up the assembly. The barrel is screwed into the under side of each cell cover before the battery is assembled, a flange making it irremovable through the top of the cell cover when the battery is ready for service. Another feature is a slotted top in which the vent cap slides sidewise when being removed or replaced.

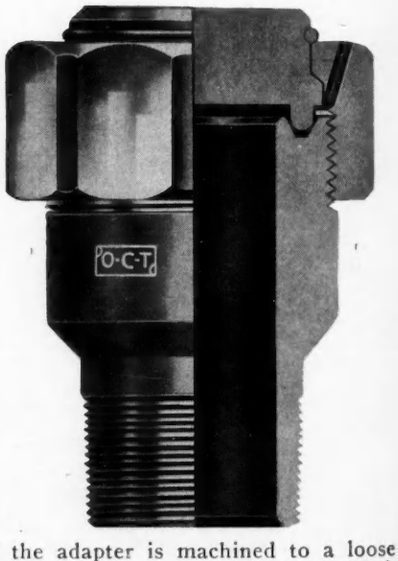
In operation, the barrel moves up when the vent cap is unscrewed and at the same time the two air vents located on each side of the barrel are closed, trapping air within the cell. As water is added the air is forced to the top of the cell and when the electrolyte's level reaches the bottom of the barrel, the air pocket beneath the cell cover prevents further addition of water.

At this point, scientifically determined, a small amount of water collects in the barrel, indicating that the safe filling level has been reached, with the non-flood device assuring sufficient space within the cell for the electrolyte to expand.

The barrel is firmly anchored, and holds the vent cap securely in place when the cap is screwed down. Air vents are opened, the trapped air escapes, and the water remaining in the barrel flows freely into the cell, without bringing the battery solution above the safe level.

QUICK-CHANGE CHOKE ADAPTER
Oil Center Tool Company

Oil Center Tool Company, Houston, Texas, is offering to the trade a Quick-Change Choke Adapter, which, according to the manufacturer, is designed to eliminate the hazard caused by conventional threaded bull plugs.



This adapter, installs on the Christmas tree in the same manner as a bull plug, but instead of breaking out the tapered thread connection each time it becomes necessary to change the positive choke, the straight thread connection between the hexagon nut cap and body of the adapter is broken. According to the manufacturer, this straight thread may be broken and re-made as often as desired without damaging the threads. The connection between the cap and body of the adapter is machined to a loose fit, and can be made up by hand. One turn with a wrench applies sufficient pressure on the ground joint seat to effect a seal. This loose, straight thread definitely eliminates galling and freezing.

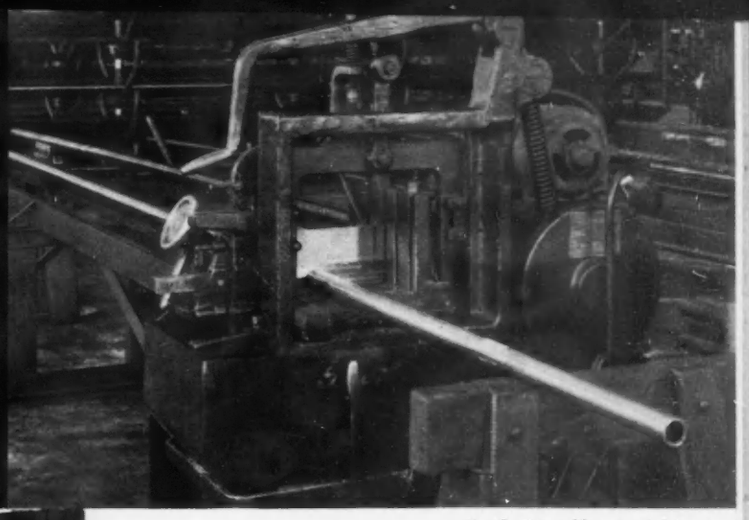
The adapter, drilled for ½-inch pressure gauge, is highly recommended for use as the top connection on Christmas trees to facilitate taking of bottom-hole pressures. The hexagon nut cap can be removed easily and quickly without strain on the Christmas tree. An O-C-T adapter for connecting the bottom-hole-pressure-taking equipment to the tree is also available.

A small port is provided in the hexagon nut cap of the adapter to relieve trapped gas and oil upon releasing the cap. For the sake of cleanliness, the port is located to direct the trapped oil away from the Christmas tree.

The adapter is made of forged steel. Two-inch and 2½-inch sizes made in 6000-pound test; 3-inch and 4-inch sizes available in test pressure up to 10,000 pounds.

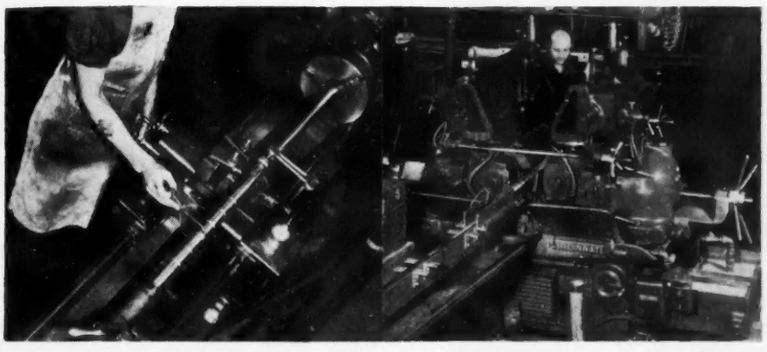
LIFE

AT THE BOTTOM OF YOUR WELL



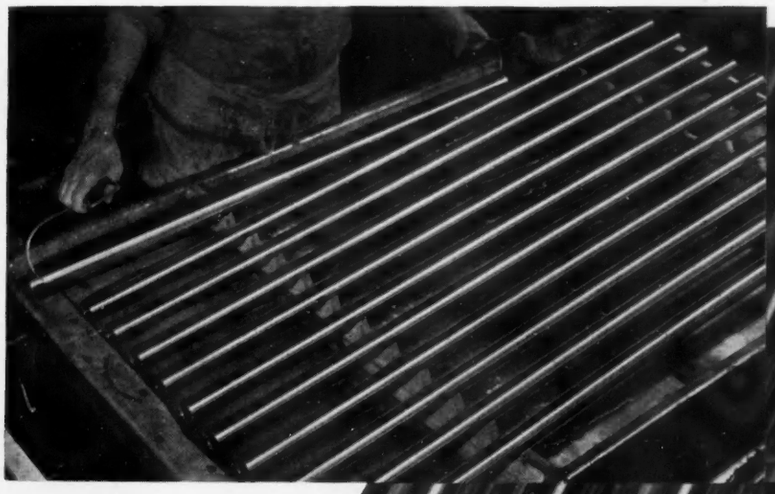
2. Heat treating Super-Service Plungers.

3. Testing Super-Service Plungers for hardness.



4. Turning grooves in Plungers.

5. Polishing Plungers to mirror finish.



6. Resting on fibre-covered racks, Axelson plungers are gaged and stamped to show exact diameter. After exact gaging, no hand touches the surface. They are transferred to the de-greasing and rust-preventing departments with bronze hooks inserted in the ends, to prevent the slightest scratch or blemish on the polished surface.

It's the plunger in your pump that lifts the oil. It's the quality of the steel in the plunger that makes it resist corrosion. It's the heat treatment that makes it hard and tough so that it will better stand up against the abrasion of sand and shale. It's the final finish to close tolerances that permits the proper fit with the liners, reducing friction and fluid slippage. It's the standardization to exact lengths, diameters and fits that enables you to replace plungers, if needed, without pulling your tubing.

It's all these fine points about Axelson plungers — together with countless other fine points about Axelson seats and balls, cages, collars, jackets, paraffine scrapers and final assembly, that give you positive assurance of long pump *life at the bottom of your well* and maximum production at minimum cost for power and maintenance as long as your oil lasts.

1. Cutting Plunger tubing to length.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON

DEEP WELL PLUNGER PUMPS · SUCKER RODS

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Factory Representative, Maracaibo, Venezuela • Armco International Corp., Buenos Aires, Argentina

This Week with the Industry's EQUIPMENT SUPPLIERS

Petroleum Equipment Suppliers Elect J. L. Shakely President

J. L. Shakely of Tulsa, president of Frick-Reid Supply Corporation, was elected president of the Petroleum Equipment Suppliers Association at a meeting of the membership held at Chicago on November 14, during the annual meeting of the American Petroleum Institute. E. S. Dulin, president of Byron Jackson Company, Los Angeles, was elected vice president and Wharton Weems of Houston was re-elected executive secretary and counsel.

The following directors were elected:

Pacific District

F. C. Merritt, E. S. Dulin, D. S. Faulkner, L. H. Keim, J. A. Crawford, Roy Sommers, E. M. Smith and J. C. Axelson.

Eastern District

John M. Crawford Percy C. Jones, J. A. Geismar, Frederick F. Murray, Donald Mackie and Jerry McJunkin.

E. S. DULIN
Elected vice president of Petroleum Equipment Suppliers Association.

J. L. SHAKELY
Elected president of Petroleum Equipment Suppliers Association.

Mid-Continent and Rocky Mountain District

J. L. Shakely, W. M. Bovaird, F. E. Bernsen, Earl W. Miller, A. A. Moody and D. R. Brown.

Southwestern District

W. L. Childs, W. J. Morris, Stanley P. Brown, John T. Crotty, T. T. Word and E. W. Gildart.

Turner Joins Sales Staff of Clark Bros.

Clark Bros. Company, Olean, New York, has recently announced the addition of R. H. Turner to its sales staff, with headquarters at the Tulsa branch office and warehouse. Turner is a graduate of the U. S. Naval Academy at Annapolis, and has had wide experience in the natural gasoline field, having served in the gasoline department of the Louisiana Oil & Refining Company for several years. Later he was appointed sales representative at Dallas, Texas, for the C. F. Braun Company of California.

Turner will assist the company's Tulsa sales staff in its sales and service operations in the Mid-Continent area.

Gifford Transferred by Billings & Spencer

The Billings & Spencer Company, Hartford, Connecticut, has announced the transfer of A. S. Gifford, Jr., a direct factory representative, to Los Angeles, California.

Gifford's knowledge of the company's forged tools and particularly those products used in oil fields will be of value to all oil men using and purchasinging oil field tools and wrenches.

Foote Bros. Appoint Two Representatives

Foote Bros. Gear and Machine Corporation, Chicago, Illinois, has announced the appointment of the following representatives:

Murray - Baker - Frederick Company, 715 Linden Avenue, Shreveport, Louisiana, as district representatives for northern Louisiana and southern Arkansas, and Lloyd C. Taylor, as district representative for IXL gear and reducer products for the State of Virginia. Taylor's address is P.O. Box 113, Richmond, Virginia.

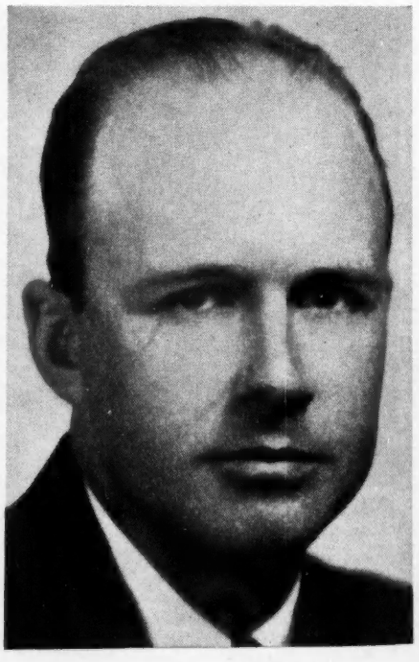
Barrow Takes Charge of Lamtex Corporation

Lamtex Equipment Corporation, Fort Worth, Texas, has just announced that Wm. R. Barrow, chairman of the board, is now in active charge of the company, succeeding Fred Cox, who is no longer connected with the company.

Kibele Manufacturing Company Names Houston Representative

John W. Yerger of Houston, on November 1 became sales representative in South Louisiana, Texas Gulf Coast and Southwest Texas of Kibele Manufacturing Company of Dallas. He will sell the company's complete line of boiler feed pump pistons, swabs, tubing catchers and valve-in-head packers.

Yerger for a number of years represented Well Equipment Corporation of Houston in South Louisiana and the Gulf Coast. He is a native of Vicksburg, Mississippi, attended Louisiana State University where he took a course in mechanical engineering and has lived in Houston for the past 10 years. He will continue to make his headquarters in the latter city.



JOHN W. YERGER
Represents Kibele Manufacturing Company out of Houston

Standco
NO-SMOKE
STANDCO BRAKE LINING
Nothing novel—no bunk—but it gets the job done without scoring brake rims. See page 1940, Composite Catalog.
Standard Brake Lining Co.

Squeaks from the Bull Wheel

Two of a Kind

"Those newlyweds are pretty well matched, aren't they?"

"Yeah, she's a grass widow and he's a vegetarian."

A Howling Success

Is your married life one grand sweet song?

Well, since our baby's been born it's been more like an opera, full of grand marches, with loud calls for the author every night.

East Is East

A tourist journeying from Cairo to the great pyramid thought he had at last found a place where nothing savored of Western civilization. The "Arabian Nights" atmosphere of ancient days made him sigh with delight.

Reaching the pyramids, he was hoisted to the back of a camel by a picturesque Arab.

"Tell me, my good man," he said to his guide, "what is the name of your camel?"

"Mae West, sir," came the answer.

Mashed

"Why are you running that steam roller over that field?"

"I'm goin' to raise mashed potatoes this year."

Paraphrase

The pupil was asked to paraphrase the sentence: "He was bent on seeing her."

He wrote: "The sight of her doubled him up."

Literal

Tommy was listening to some of his sailor uncle's adventures:

"You see, sonny, I always believe in fighting the enemy with his own weapons," said the uncle.

"Really?" gasped Tommy. "How long does it take you to sting a wasp?"

License Granted

Investigator: "And what is the white line in the middle of the road for?"

Applicant: "For bicycles, I suppose."

Worth Knowing

Gentleman (at the police station): "Could I see the man who was arrested for robbing our house last night?"

Desk Sergeant: "This is very irregular. Why do you want to see him?"

Gentleman: "I want to ask him how he got in without awakening my wife."

Back on the Pay Roll

"Did that star football player graduate last year?"

"No, he renewed his contract for another year."

Just the Ends

"Could you suggest something suitable for a girl friend's anniversary?"

"How about these book ends?"

"Just the thing! She always reads them before she does the beginnings.—Christian Science Monitor.

Some Speed Eh?

A tourist grouch was traveling in a desolate part of a southern state. He stopped at a filling station and waited impatiently while the attendant slowly serviced his car. Lolling lazily in the shade next to the station were two natives. The tourist mumbled under his breath, but loud enough for all to hear, "These people around here are the laziest I ever saw."

One of the lollers turned to the other and drawled, "Say, Bill, I seed a dog chasin' a rabbit yes'erday, but they weren't in no hurry—both were walkin'."

No Help

His flivver stopped and died,
As those things often do;
A passing preacher kindly asked,
"What can I do for you?"
"Nothing, sir," the driver said.
Won't do no good to pray,
And you're no man to help me think
Of words I've got to say."

Got Her Man

Did I look nervous during the ceremony?

No, darling, not after Jack said "I do."

Jimmy Guessed It

"What is the new baby at your house, Jimmy, a boy or a girl?"

"Aw, I guess it's a girl. I saw 'em puttin' powder on it."

The Dentist's Error

"I saw a dental cripple this afternoon."

"What, a guy with bum teeth?"

"Naw, a dentist who flirted with a prize-fighter's wife."

Two's Company

"Just between you unt me, Herman, vot you tink of Lena Schuitzel?"

"Between you unt me not so hot, Jake, but alone, oh poy."

Mom's Part

"Mom, we're going to play we're elephants at the zoo and we want you to help us."

"Why, what in the world could I do to help, son?"

"Well, we want you to be the kind-hearted lady who feeds them peanuts and candy."

Value of College Education

"Has your son's college education been of any value?"

"Oh, yes, it cured his mother of bragging about him."

Sounding Off

Hubby—Hey, you woke me out of a sound sleep.

Wifey—I had to. The sound was too loud.

A "*Bird*" IN THE HAND!

"The Entirely Different Boiler and Engine Treatment"

Your power plant is entitled to a real Thanksgiving Feast, too. And if you serve this "bird" to your boilers and engines they WILL SERVE YOU BETTER!

In the sustaining of healthy power plant life, Sand-Banum is a rare "bird of distinction." It comes **ready for use** in 16 oz. cans and is so highly concentrated with pure colloidal ingredients that one small can will protect a 250 Hp. boiler for one month! Yet it is absolutely harmless to all parts of your boiler's anatomy.

Just think how SIMPLE it is to "treat" your boilers and engines with Sand-Banum. And you can always rest assured that scale or corrosion cannot form, or remain, in its presence regardless of the operating conditions or the nature of the water used. Still it costs **less** than other "diets"! Send for booklet "HOW and WHY" then try it on our "Satisfaction or No Money" guarantee.

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